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THE

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COMPRISING TEN VOLUMES ON THE YEAR'S PROGRESS IN MEDICINE AND SURGERY

UNDER THE GENERAL EDITORIAL CHARGE OF

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VOLUME VIII

MATERIA MEDICA AND THERAPEUTICS
PREVENTIVE MEDICINE
CLIMATOLOGY

EDITED BY

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DEPARTMENTS

Materia Medica and Therapeutics

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MATERIA MEDICA AND THERAPEUTICS.

In presenting an epitome of that portion of the medical literature of the past year which bears upon materia medica and therapeutics, the Editor wishes to explain the classification adopted. In general, drugs and therapeutic agents are arranged in alphabetic order, but there are a few exceptions. For example, under the heading "Iodin and its Compounds," the iodids and iodin derivatives are to be looked for. All the sodium compounds not found under the iodids, citrates, and nitrates, are found under the heading "Sodium." All extracts of animal organs such as adrenalin, pituitrin, etc., are under the heading "Organotherapy." Under "Salicylic Acid" are to be found all the salicylates and the salicylic acid derivatives, including aspirin—acetylsalicylic acid. Radium, thorium, and mesothorium are grouped under "Radiotherapy." Attention is also called to the comprehensive headings "Serotherapy," which includes diphtheria antitoxin, and "Vaccine Therapy."

ALCOHOL.

Alcohol Injections into the Gasserian Ganglion. Loevy[1] has applied on forty cadavers the method of injection of alcohol into the ganglion through the oval foramen, and here discusses special points in the technic. He then reports the successful application of the method to a man of 77 with unbearable neuralgia for three months, with severe arteriosclerosis and bronchitis. About 0.8 c.c. of alcohol was injected and the man said he felt as if that side of his head had been struck by lightning but after a minute or two all pains ceased. He could eat at once without a trace of pain and there has been no recurrence during nearly five months since. The patient regards his relief as an actual miracle.

(1) Berl. klin. Wochenschr., April 28, 1913.

Effects of Alcohol Injections into Nerves. L. Beriel and A. Devic[2] point out that the reactions caused by the introduction of "lytic" agents in nerves are not as yet well known. They report experimental work on rabbits, in which it was found, in the first place, that even with considerable pressure, only a few drops of alcohol could be made actually to penetrate the substance of the sciatic nerve. Degenerative changes subsequently occurred in the nerve fibers, even at a distance, but total transverse destruction of the nerve trunk never resulted, in spite of special attempts to produce it. The conclusion reached was that alcohol diffuses but little in nerve tissue, and that destructive changes take place only in fibers coming directly in contact with the alcohol.

Intestinal Absorption of Alcohol. Hanzlik's[3] present investigation deals with ethyl alcohol; *i. e.,* ordinary grain alcohol. Definite quantities of alcohol of a known strength were injected into duplicate ligated loops of intestine of equal length (15 cm.), the absorption being allowed to continue for a given length of time under varying conditions. At the end of the interval, the loops were excised and the alcohol recovered from the contents and intestinal wall and its quantity deduced from the specific gravity. It was found that when approximately 10 per cent. alcohol is introduced into the intestinal tracts of dogs and cats in doses of 10 c.c. per kilo, there is an arrest of absorption at the end of half an hour after injection. This is independent of the percentage absorbed, which varies from 33 to 85 per cent., leaving from 15 to 67 per cent. of the alcohol unabsorbed. A comparatively slight and almost neglible absorption continues for one or two hours.

Hanzlik is convinced that the incomplete absorption of alcohol is not due to re-excretion, since the intestinal canal excretes a much smaller quantity (0 to 0.14 gm.) than that which remains in the intestine when absorption is arrested. There must, therefore, be an actual inhibition of absorption. This does not seem to be due to a strictly local action, for preliminary treatment of

(2) Lyon Méd., June 1, 1913.
(3) Cleveland Med. Jour., April, 1913.

an intestinal loop with alcohol does not inhibit the absorption of subsequent portions of alcohol from the same loop. On the other hand, the absorption from the intestine is diminished 5 to 20 per cent. by intravenous injections of 10 per cent. alcohol. The effect, therefore, seems to be systemic. It is not, however, due to changes in the systemic blood-pressure.

In addition the following facts were established: The absorption of alcohol differs for different individuals of the same species, but the average was practically the same in the different animals studied; *i. e.*, cats and dogs. The same was true of phenol and sodium iodide. The extent of intestinal surface does not affect the absorption of alcohol. Phenol and iodide behaved in a similar manner. The absorption of alcohol is about the same for all divisions of the small intestines although slightly higher in the stomach and greatest in the colon. With phenol, the absorption was quantitatively identical for the stomach and intestine. In the case of the iodide the absorption was about a third less in the stomach and colon than in the small intestine. The absorption is scarcely influenced by the concentration of the alcohol, although a 10 per cent. solution of alcohol is absorbed slightly better than 5 and 50 per cent. solutions. Undiluted phenol was found to be absorbed a trifle better than a 5 per cent. solution.

With the sodium iodide, the 10 per cent. solution was absorbed best, while weaker solutions; *i. e.*, 1, 2 and 5 per cent. solutions somewhat less. Necrotic agents, such as formaldehyd and concentrated phenol; and calcium chloride, which diminishes the permeability of cells; and sodium fluoride, which acts as a protoplasmic poison, all diminish the absorption of alcohol. Agents which cause visible anemia tend to lessen the absorption, while those which cause visible hyperemia tend to increase it. Practically the same results were obtained with phenol and sodium iodide. After death the absorption of alcohol from the stomach and intestinal loops is comparatively good, averaging about 19.6 per cent. For phenol the post-mortem absorption averaged about 16 per cent.; for sodium iodide about 35 per cent.

ALKALIES.

Alkalies and Hyperchlorhydria. It was noticed by P. C. Tupper[4] that 10 per cent. of the patients with high gastric acidity receiving sodium bicarbonate gave a history of distress—belching, bloated feeling, sense of weakness, or obscure nervous symptoms—immediately after the ingestion of the drug, and in some cases severe flatulence where none had existed prior to treatment. On substitution of magnesium oxide with a small quantity of bismuth subnitrate suspended in water for the sodium bicarbonate, it was observed that the patients, a large percentage of whom had been constipated before, no longer required the Carlsbad salt previously prescribed for this condition. In fact, diarrhea appeared, the soluble magnesium chloride formed by interaction with the hydrochloric acid in the stomach performing the rôle of a cathartic.

These observations have led Tupper to employ the following treatment in hyperchlorhydric cases: If the patient is constipated at the beginning of treatment, he prescribes a suspension of magnesia and bismuth, 1 teaspoonful or less after meals and again one and a half hours later; each dose represents 6 grains (0.4 Gm.) of magnesium hydroxide and 22 grains (1.5 Gm.) of bismuth subnitrate. This is continued for from three to five days, and if the evacuations continue to be too frequent, at the expense of the patient's already reduced weight and strength, the foregoing is discontinued in favor of a powder containing equal volumes of magnesium oxide and magnesium carbonate, with a little powdered charcoal and sometimes bismuth.

Provided the clinician accurately estimates the degree of hyperchlorhydria from time to time, and prescribes always less magnesium oxide than the amount capable of neutralizing completely all the acid present, lessening the dose as the condition improves, and discontinuing it altogether when the free acid found at the height of digestion is within normal limits, the formation of concretions attributed by some writers to the prolonged use

(4) New York Med. Jour., Jan. 25, 1913.

of magnesium oxide would seem to be impossible. The charcoal may not absorb much gas, but at least it imparts a gray coloration to the mixture—a factor often of psychic benefit in these cases.

APOMORPHINE.

Uses of Apomorphine. In any case in which relaxation is wanted, Epting[5] believes one can use apomorphine with quick and good results. It is useful, he says, in croup, asthma, hysteria, eclampsia, tetanus and convulsions, even from strychnine poisoning. In eclampsia, when large enough doses of morphine are contraindicated,one can relax the patient, control the convulsion, and produce elimination through the skin (thus relieving the kidneys) by the use of 1/20 grain apomorphine and 1/12 grain morphine.

Apomorphine is especially valuable in all hysterical cases in which the patients are rigid, for it will not only give relief, but will help to effect a cure.

For delirium tremens, or even a "big drunk," apomorphine with a small dose of morphine and atropine and, if needed, a small dose of a heart stimulant, will sober the individual in a short time.

In some patients, morphine alone does not have the desired hypnotic effect, and in some it causes nausea; if 1/40 grain of apomorphine be added to the morphine given in such cases, the desired hypnotic effect will be produced quickly without the nausea following.

The mode of administration is very important.

As an emetic, apomorphine should always be given hypodermically. The stomach should be filled with warm water before the injection is given, as this aids the apomorphine in emptying the stomach and makes vomiting easier. In cases of this kind (except opium poisoning) when Epting administers emetic doses of apomorphine he always combines a small dose of morphine and atropine and, if the heart is weak, strychnine also. When thus given the nausea will be over soon, and rest and sleep will come quicker.

(5) Charlotte Med. Jour., February, 1913.

As an expectorant, he advises giving frequent small doses by mouth.

For pain, when the nervous tension is great, and morphine is administered, quicker relief can be obtained with less of the bad after-effect of morphine if 1/30 grain of apomorphine is added. In hepatic or kidney colic, relaxation is especially needed; it can be procured with apomorphine added to the morphine. There is also less danger of the patient forming the "morphine habit" when this combination is administered.

As an expectorant Epting states that he gives frequent small doses of 1/30 grain by the mouth, until the effect is produced.

As an emetic, the dose is 1/20 grain apomorphine, 1/12 grain morphine, and 1/300 grain atropine. He always gives several glasses of warm salt water, with the suggestion that the water will cause vomiting.

Reasonable care should be taken in administering this drug to very weak patients, to the aged and to young children.

ARSENIC.*

Arsen-triferrol in Anemia. Arsen-triferrol, an organic combination of iron with arsenic, is stated not to be decomposed in the stomach and therefore absorbed only in the intestinal tract without causing disagreeable gastric symptoms. E. Hartung[6] writes that patients with anemia who can not take iron in the usual form rapidly improve with this preparation, no matter what the gastric complication. The action is direct, since the bone marrow is stimulated, and also indirect, in that the appetite is increased and the patients are thus able to take more food. As a rule, there is soon a pronounced increase in weight. The author reports excellent results in chlorosis, dysmenorrhea, anemia in children, inoperable carcinoma of the stomach, secondary syphilis, hysteria and neurasthenia. It usually makes little difference whether there is too much or too little hydrochloric acid in the stomach; the preparation seems well tolerated by all.

(6) Klin.-therap. Wochenschr., No. 2, 1913.

* See also articles on Salvarsan and Neosalvarsan, p. 165.

Beneficial Influence of Arseno-benzol on the Fetus of Luetic Mother. In a memoir on the treatment of pregnant syphilitic women, published by the Medical Society of the Hospitals of Paris, Jeanselme, Vernes, and Block,[7] in collaboration, detail their experience with salvarsan as a possible preventive of congenital lues. The results have been encouraging; out of 18 women thus treated, 16 gave birth to living, viable children. Of that number of children, 4 died afterward of diseases not specific; while the other 10 have displayed not a sign of the infection after a considerable period of observation. As to the 2 dead-born fetuses, the authors assume that they had died before initiation of the arsenical treatment.

A full description of the method of administering the injections is given. The average was about six doses at one-week intervals.

Arsenic Paralysis After Salvarsan. Obermiller[8] insists that the symptoms of arsenic poisoning and those called the by-effects of salvarsan are identical, and he here presents further evidence to sustain the identity of arsenic and salvarsan paraplegias. He has been making a special study of paralysis from arsenic poisoning and compares seventy articles on the subject. All testify, he says, to the fact that with arsenic paralysis there is always degeneration in the peripheral nerves and spinal cord. The typical degeneration, the non-inflammatory changes, in the spinal cord characteristic of arsenic poisoning, were found in Wolff-Mulzer's recent case of salvarsan poisoning. This supplies the last link in the chain of evidence for the purely arsenic-toxic nature of salvarsan paraplegias. The lack of regularity in the development of the disturbances shows that the toxic action varies with the individual and constitutional condition of the patient.

Arsenic Poisoning in Wall Paper. Lindstrom[9] occupied with his 11-year-old son two newly painted rooms in a Swedish hospital, where he was assistant physician.

(7) Zentralb. f. d. Ges. Gynäk., p. 106, 1913.
(8) Berlin. klin. Wochenschr., May 26, 1913.
(9) Wien. klin. Wochenschr., May 1, 1913.

He developed intense "neuralgia" persisting for many months and arsenic was found in the oil paint on the walls, in considerable amounts, 2.8 mg. in 200 c.c. Arsenic was found in the urine for several months after removal of the paint from the walls. The rest of the family had arsenic in the urine also but not in such large amounts, as the other room had received only two coats of the paint, while in the room occupied by Lindstrom four coats had been applied. It was found that the arsenic had worked from the deeper layers to the surface, and scraps of wood from the doors also responded to tests for arsenic. He occupied the rooms for four months and then left for a vacation trip. On the journey the first neuralgic pains developed in the right axillary and sacral nerves, and distressed him during movements but subsided when he lay still. This "neuralgia" lasted a month and then subsided during the summer—the season of open windows—but the next winter it returned in the arm and shoulder, with intense severity, until he could not use his right hand. The pain at last became like that of a phlegmon and involved the back, and his boy developed rebellious conjunctivitis and grew pale and thin. Then for the first time arsenic poisoning was suspected and examination of the urine revealed the arsenic. The pain in his arm for five months was so severe that he even thought of amputation but there was no actual paralysis.

ATROPINE.

Atropine in Treatment of the Exudative Diathesis. N. Krasnogorski[1] recalls that if the chromaffin system (the epinephrin-producing apparatus) is hypoplastic, the sympathetic nervous system lacks the stimulus from the epinephrin, as is also the case when there is hyperplasia of the lymphoid organs (the antagonist apparatus). The result is a condition of tonus of the vagus nervous system, called, "vagotony" by Eppinger and Hess. The symptoms of this vagotony seem to be the same as those of the exudative diathesis described by Czerny. Krasnogorski consequently gave atropine to

(1) Monatss. f. Kinderheilk., Berlin.

act on the vagus nervous system to six children with the exudative diathesis and reports excellent results. It inhibits the exudation and the effects were most brilliant in the cases of moist eczema. It was also beneficial in chronic bronchitis and broncho-pneumonia in children exhibiting symptoms of the exudative diathesis. Large doses of the atropine can be given in these cases. He gave infants of 4 or 5 months a solution of atropine sulphate corresponding to the maximum dose for adults, namely, 0.0025 gm. atropine sulphate *per diem*. No dilatation of the pupils was observed and no acceleration of the heart action.

Value of Atropine in Gastric Disturbances. Pletnev[2] is credited with the statement that while atropine can at best only constitute a symptomatic measure in the treatment of stomach disorders, it deserves to be much more widely employed than has hitherto been the case. When gastric acidity is increased, atropine will reduce it indirectly, *viz.*, by diminishing the amount of gastric juice secreted, so that a great proportion of it will be neutralized by the alkaline mucus present. In pyloric spasm atropine also gives relief, probably in part by reducing acidity, but also by a direct "antispasmodic" action, as is indicated by the fact that hour-glass contracture of functional origin is similarly removed. In cases of over-acidity or gastric ulcer, pain is favorably influenced by atropine, which is preferable for this purpose to morphine because the latter, after temporarily reducing the secretion of gastric juice, excites glandular activity.

Atropine in Phosphaturia. Umber[3] advises the cautious administration of atropine, in 0.5 mgm. (1/128 grain) doses after each meal, in order to increase the acidity of the urine and thereby check phosphaturia. He says that, if necessary, the dose may be increased to 1.0 mgm. (1/64 grain) and continued for a fortnight, when it may again be reduced to 0.5 mgm.

Atropine Reaction in Heart Disease. In discussing the prognostic significance of the atropine reaction in

(2) Semaine Méd., March 26, 1913.
(3) Therap. d. Gegenw. Nouv. Rem., 30, 182, 1913.

cardiac disease, Talley[4] writes that the throat dryness and impaired vision resulting from administration of from 1/50 to 1/25 of a grain hypodermically soon passes off without any other untoward effect. This method of releasing the vagus action, and of comparing the effect on normal and diseased hearts, led to the use of the reaction in the study and treatment of cardiac disease, and showed its prognostic significance in cardiac cases, especially auricular fibrillation, and how it may be used in the study of digitalis action, since it was found to be unusual for patients giving small reactions to respond well to digitalis. Patients with rheumatic mitral disease developing auricular fibrillation with rapid pulse rate, gave large atropine reactions, the pulse rate, with the vagal influence abolished, depending on either stimulus production or conduction. Cases of auricular fibrillation show marked slowing under digitalis, many small beats disappearing, the remainder being more even in height and the diastolic pauses more regular. Under atropine many of the small beats reappear at the expense of the diastolic pauses as the pulse accelerates. The atropine reaction in the normal heart is probably from 30 to 40, and a reaction of 20 or less, in a heart not recently subjected to exhausting disease, points to degeneration of the cardiac muscle, and makes the chance of improvement under treatment unpromising. Individuals with auricular fibrillation, with responses normal or above, are promising subjects for treatment, two reactions, one before and one on full digitalis, enabling a determination possible as to whether the vagal or the cardiac tissue factor is the greater. Those patients with a large cardiac tissue factor are usually the ones sufficiently improved by treatment to return to their occupations.

Use and Abuse of Atropine in Eye Work. It is to the main usage of atropine, the field in which it has no competitor that Harman[5] gives his attention. In acute iritis the use of atropine is of first importance. No matter what the general cause of the iritis may be, and what general treatment may be considered necessary or even

(4) Amer. Jour. Med. Sci., October, 1912.
(5) West London Med. Jour., January, 1913.

urgent, the eye wants atropine, and the use or effective use of the atropine must come before all else. We must, if possible, get the pupil open widely; that checks the iritis, prevents adhesion, and saves the vision for the future. But its use must be effectual; to use it ineffectually is not to use it but to abuse it.

A very powerful method of administering atropine is to place a small crystal of the sulphate directly in the conjunctiva and allow it to be dissolved by the tears. That method he does not like; the risk of toxic effects are too grave. The most powerful effect can be obtained by a combination of atropine and cocaine. Each will supplement the work of the other, as has been previously explained. A 2 per cent. solution of each in water, in castor oil, or in an ointment of lanoline or vaseline gives perfect results.

Harman prefers the oil and the ointment—the oil for his own use, the ointment for home use. The oil spreads immediately and acts quickly, and leaves the eye clean for examination. The ointment is best for home use, for the attendant can see what becomes of the piece of ointment; it is either placed between the lids or it is not. With the watery solution an unskilful attendant more often than not drops the solution on to the cheek. Again, there is less risk of toxic symptoms and skin irritation with the oily and ointment preparations, for less is used, and but little gets into the nose.

In the case of acute iritis such a preparation should be used every two hours for the first twelve hours, and the atropine should be put in, for the first time at any rate, by the surgeon himself. If the pupil can be dilated it will dilate under such treatment, combined with leeching, fomenting, purging, or such general measures as the case may indicate. To use weak solutions of atropine, 0.25 or 0.50 per cent., is utterly futile. It is not using atropine, it is abusing it, for it is a pretense at its use.

Again, to continue the use of an efficient atropine preparation day after day when the pupil will not dilate because of firm old synechiae is to abuse the drug; for the ineffectual tugging of the muscles at the tough adhesions only irritates the eye.

Excluding these points, a mistaken use of atropine is most often due to a mistake in diagnosis. This is no place to enter into a differential diagnosis of conjunctivis, iritis, and glaucoma. But the best guard against such an error is always to watch the pupil. In an acutely inflamed eye a small pupil may mean iritis, but if it promptly dilates large and round it is surely not iritis, but probably only conjunctivis. If the pupil dilates, but with pointed irregularities, there is, or has been iritis. If the pupil is large, more or less oval or sluggish, it is most probably glaucoma. We should examine the pupil at each time a case is seen and look at it in a good light and through the best magnifying glass we possess. These things have to be looked for; they are not manifest to casual glances.

In chronic iritis atropine is less useful; sometimes it is injurious. In most of these cases the co-existing cyclitis is the more serious condition, and whilst the atropine dilates or benefits the iris, it relaxes the ciliary muscles and allows of an added engorgement of the ciliary body. If there be evidence of severe cyclitis in the presence of vitreous opacities, atropine had better be discarded and only a temporary mydriatic be used on occasions to insure that the iris is not becoming adherent.

With few exceptions atropine ointment is the most comforting of applications for all sorts of corneal ulcers or injuries. The fatty base is comforting; the drug quiets the reflex irritation set up from the cornea. There are some cases, however, in which a sudden change from atropine to eserine works miracles.

Chronic relapsing phlyctenular ulcers, old and sluggish ulcers with much vascular penetration, do not always do well with atropine, but they may clear up with surprising quickness when the stimulus of eserine is applied. It is nearly as effective as the operative destruction of the invading vessels by peritomy or the cautery.

The use of atropine after wounds of the cornea, accidental or operative, is always a puzzle to the beginner. What shall he use, atropine or eserine? Which will best keep the iris from prolapse?

Harman's answer is, when in doubt in these cases use

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atropine, and his reason is this: when the anterior chamber is open the aqueous flows directly through the opening instead of by the usual outlet, and it escapes in spurts as the pressure of the aqueous is able to force open the wound. However effectively eserine may contract the pupil it will not prevent the iris being rushed into the wound on such a sudden escape of aqueous—in fact, the collection of aqueous behind the contracted pupil helps to cause this relapse. The iris is most secure when it is folded right back into the corneal angle. This applies both to injuries and to cataract extraction, where iridectomy is not done. From his experience of Liebreich's extraction without iridectomy, Harman is convinced that some of the risk of prolapse ascribed to this measure is due to the incorrect use of eserine. Use atropine, and this risk is sensibly reduced.

In conclusion he refers to those few patients who are intolerant of atropine. In these the most careful usage may set up a smart, hot, dry "eczema" of the lids. When there is an acute iritis this state of affairs is most unfortunate. It may sometimes be avoided by thickly greasing the lids and skin with vaseline and dropping the smallest drop of a watery solution of atropine on the conjunctiva and sopping up with wool any tear that shows itself. Even that may not succeed, and one must fall back upon hyoscine or duboisine; the effect of homatropine does not last long enough for such a purpose.

Then there are children who have suffered from phlyctenular keratitis or chronic blepharitis, and in whom we wish to attempt a correction of the refraction. In those the use of atropine will often restart all the old inflammatory symptoms, so that here homatropine should be used in one application and the examination be made and concluded as soon as the eyes are ready.

Atropine in Stomach Disease. Pletneff[6] reports his experience with atropine in twenty-eight cases of various stomach disorders. The dose was 0.001 gm. (1/60 grain) hypodermically, once a day, for a period of nine days, and in some cases for two weeks. He found that atropine caused decrease of gastric secretion, decrease of its acid-

(6) Med. Obozr., Moscow, 1913.

ity, and reduced the pain and spasmodic contraction, the results corresponding with those of Riegel's experiments on animals. The reduction in secretory functioning causes diminished acidity, which in its turn puts an end to the pylorospasm and pain. The therapeutic effects of atropine are but temporary, its action being symptomatic only; in this regard it is much superior to morphine.

AUTOSEROTHERAPY AND AUTOMEHOTHERAPY.

B. Spiethoff[7] reports success in a number of cases of various infectious conditions, prostatitis, eczema, suppurating inguinal lymph-nodes, etc., which he treated by re-injecting some of the patient's own serum or blood. He draws the blood directly through a wide cannula into the syringe and then introduces a narrow cannula inside the first one, and re-injects the blood or serum at once through this second cannula. He has applied the measure in some cases five days in succession, re-injecting each time 20 c.c. of the patient's own blood. The reaction seems to be the same to the blood as to the serum; local reactions develop and changes in the white corpuscles are noted.

Autoserotherapy of Cancer. Lewin[8] has only two cases to report, but the results were so extraordinarily good with these that he urges others to treat patients with ascites from carcinosis by re-injection of 10 c.c. of their own ascitic fluid after tapping. One of his patients, a woman of 57, seemed to have less than a month to live when he first saw her, but under autoserotherapy she was apparently cured and survived in comparatively good health for eighteen months after her dismissal. First one breast and then the other had to be amputated for recurring carcinoma and during the three months following she had to be tapped a number of times. Each time 10 c.c. of the fluid was re-injected into the subcutaneous tissue before the needle was withdrawn. The other patient was a woman of 46 with metastatic nodules

(7) Med. Klinik, June 15, 1913.
(8) Therap. der Gegenw., June, 1913.

in the remaining breast. She was given five injections of 10 c.c. each of an autolysate of cancer cells, supplemented by potassium iodide (on account of the positive Wassermann reaction). The recurring nodules gradually disappeared so that the woman for a year has been comparatively well. Lewin thinks that there is a future for this autoserotherapy or autovaccination, especially as an adjuvant to radiotherapy or other measures.

BACTERIOTHERAPY.

Bacterin Treatment of Rheumatoid Arthritis. There are two interesting papers on the subject named in the title, in the *Lancet*.[9] The first, by Crowe, is a study of the bacterial flora of the urine in cases of rheumatoid arthritis. A considerable number of cases were investigated, the most striking fact being the demonstration of the presence of a staphylococcus resembling somewhat the *Staphylococcus pyogenes albus*. This he called staphyloid coccus *A*. Crowe says this closely resembles, and certainly may be a member of, that group of germs called *Micrococcus epidermis albus*.

In 14 cases of rheumatism, this growth was found in 5; in 3 cases of neuritis, it was found in 2; and in 22 cases of rheumatoid arthritis, it was found in 14. Streptococci were also found in 8 of the cases of rheumatism; in all the cases of neuritis, and in 6 of the 22 cases of rheumatoid arthritis. On account of its possible etiologic connection with rheumatoid arthritis, Crowe prepared, and recommends, a special staphyloid bacterin.

In the succeeding paper in the same issue of the *Lancet*, Soltau gives his experience in the treatment of some cases of rheumatoid arthritis with Crowe's staphyloid bacterin. His method of treatment is as follows:

In cases showing mixed infection, that is, association of the staphyloid coccus with the streptococcus, he begins treatment with a bacterin made from the secondary organism, the streptococcus. Following its administration, the joint condition is ameliorated and the patient usually experiences a sense of improved well-being, al-

(9) Lancet, May 17, 1913.

though in no instance was there complete arrest by this bacterin alone. He says that it paves the way for the use of the staphyloid bacterin, which is subsequently administered and which is followed by marked improvement in the arthritis, amounting in some cases to apparent cure. The word "apparent" is used advisedly, because the lapse of time is yet too short to allow of any dogmatic statement as to the permanence of the cure.

In cases in which there is a single infection with the staphyloid coccus, without the streptococcus involvement, the staphyloid bacterin only is used. Soltau says that the question of dosage has been a difficult one to determine, owing to the marked reaction which sometimes follows even minute dosage, even as low as 500,000 dead bacteria. In one case the dose had to be reduced to 150,000 dead bacteria, at the beginning of treatment. Usually, however, the treatment is begun with 500,000, raising subsequent dosage by 500,000 or even less.

Even when small doses are used the reaction is sometimes severe. The characteristic symptoms are increased intensity of the joint pain, swelling, slight rise of temperature. The injections are usually made at weekly intervals, but each case has to be modified according to the degree of the reaction and the time of its occurrence. In one obstinate case improvement began to be manifest only when the injections were reduced to five-day intervals.

The first favorable symptom following bacterin treatment has been the reduction of nocturnal pain, which permits of more sleep and improves the general health. The neuritic pains so often complained of usually have been relieved more rapidly than the articular pain, but the most noticeable feature of the treatment has been the gradual relaxation of the joint. In fact, several patients have complained that they felt weaker, this resulting from the fact that, with increased flexibility and range of movement, the atrophied muscles are not prepared to do the increased work placed on them.

The treatment must be supplemented by gentle massage of the muscles, taking care to avoid the joint, so as to obviate auto-inoculation. Joint swellings are last

to disappear, but in some instances improvement has been very marked in this respect, while the glossiness of the skin so characteristic of the disease has often disappeared.

In the same number of the *Lancet,* A. E. Garrod is reported as stating, at a meeting of the Royal Society of Medicine, that the condition of chronic rheumatoid arthritis might be secondary to fecal infection in various parts of the alimentary canal. This is in line with the experience of many others, and suggests the necessity—whatever other treatment may be given—of keeping the alimentary canal clean and aseptic. This is of fundamental importance, whether bacterins are resorted to or not.

BATHS.

The Bath and Its Hygienic Importance. The hygienic value of bathing was never more widely appreciated than it is today. The custom of building special baths or swimming-pools in the mansions and palaces of multimillionaires is not new, however, for as an editorial writer in the *Lancet*[1] points out, the practice of bathing as a luxury or for therapeutic or hygienic purposes, as distinguished from the mere removal of discomforting superficial dirt, probably took its rise in oriental countries, passing thence through Greece to Rome, where it attained the maximum of luxuriousness in the later empire. At that time many wealthy people had complete bathing establishments attached to their villas, while there are said to have been over 870 public baths in Rome. The bath consisted of several rooms; the apodyterium, or undressing room; the frigidarium, or cool room, containing also a cold plunge bath; the tepidarium, or warm room; and the calidarium, or hot-air room, having a hot water bath at one end of it. To these, in later Latin times, was added the laconicum (so called from Laconia, where it originated) or sudatorium, where the heat was very great. The bather passed through all these rooms in succession until he arrived at the calidarium, or the laconicum. Then he returned to the tepid-

(1) Lancet, Nov. 2, 1912.

arium, where cold-water affusion was practised, and he underwent a thorough scraping, friction, kneading of muscles, and stretching of his joints at the hands of an attendant, and was subsequently anointed all over. A long rest for cooling off was then taken, prior to passing once more into the open air. The private baths of the wealthy were constructed on a similar pattern. They were highly and expensively ornate. To the public baths were attached gymnasia, colonnades, often fragrantly scented, and amphitheaters, and even libraries, so that they became the favorite lounging places of the wealthier and more fashionable citizens. In an interesting monograph Dr. W. Oscar Jennings gives full information on many of these particulars and traces the history of the bath among the Greeks, the Romans, through the Middle Ages, concluding the historical part of his book with references to the baths in France, Germany, England, Russia, Finland, and among the Turks, Egyptians, Indians, Mexicans, and Irish. Cortez found public baths among the Aztecs. Dr. Jennings especially emphasizes the universal use of the bath as a hygienic measure. Dealing in the second part of his monograph with the Turkish bath, viewed from a hygienic and therapeutic standpoint, as we know it today, Dr. Jennings reminds us that notwithstanding that "Hammams" appeared in England at the close of the seventeenth century, we owe its revival in modern times largely to the publication in 1850 by David Urquhart of "The Pillars of Hercules." This book led to the erection of a so-called Turkish bath (but rather a hot air than a vapor bath) at Blarney, by Dr. Barter, and a short time afterward to one by Sir John Fife, physician to the Newcastle-on-Tyne Infirmary. As a regulator of the bodily functions and an eliminator of toxins, Dr. Jennings extols the Turco-Roman bath—a combination of sudorotherapy, massotherapy, and hydrotherapy—which, he says, is regarded with enthusiasm by practically every practitioner who has tried it himself. He highly recommends it in conditions of faulty metabolism, and especially in alcoholic and drug addiction. As is well known, the condition of extreme depression following the stimu-

lant effect of the dose is the chief factor in compelling those who have once become addicted to keep on having recourse to the drug. But it is precisely the dispersion of this sense of depression, restlessness, and sinking, of mental and physical collapse, for which the alcoholic or the drug habitue has recourse to his poison, that is the distinguishing therapeutic characteristic of the Turkish bath. There exists, says Dr. Jennings, a certain vague resemblance between the sensations aroused by the bath and those derived from the morphine injections. Caution must be observed, it is true, especially in not being tempted to overdo it, either in duration or in the degree of temperature; and particularly must care be taken by the novice not to allow himself to be carried away by the enthusiasm of the old habitue of the bath, who is very prone to play the part of a proselytizing professor of balneotherapy. It is remarkable what a small proportion of the people of Great Britain have ever taken a Turkish bath. It is equally remarkable that few, if any, of those who have done so fail to experience the delightful sense of euphoria, and physiologic elation, which is at the same time indicative of its hygienic value and suggestive of its therapeutic possibilities. As a therapeutic measure, however, it should be practiced only under the sagacious counsel of a medical man cognizant of its effect and acquainted with the patient's condition.

Effect of the Oxygen Bath on the Heart. Fuerstenberg and Scholz[2] used the oxygen bath in eighteen cases, and conclude as follows:

The oxygen bath either decreases the heart dimensions or leaves them unchanged; it never enlarges them. In healthy subjects or patients with normal hearts the size remains unchanged. But when there is an organic or functional heart affection or an arteriosclerosis, there occurs with striking regularity a diminution in the heart limits. A positive reduction was apparent after ten baths in two cases in which the subjective condition was markedly improved. In two others, with far advanced disease process and bad prognosis, there occurred an occasional transient remission in the size of the organ,

(2) Zeitschr. f. exper. Path. u. Therap.

but the baths were unable to inhibit the progressive change for the worst.

In two cases of purely functional nervous cardiac affections, the orthodiagram showed marked shrinkage of the heart, while in another case no change was apparent.

In an arteriosclerosis the reduction in the size of the heart was particularly apparent. Moreover, the subjective condition was most favorably influenced—a fact confirmed by other observers.

Corresponding findings were reached with regard to the pulse rate and blood pressure. In the healthy subject these also remained unchanged. In all cases of organic cardiac troubles, save one in which the baths were given at 95 F., the pulse rate and blood pressure sank in correspondence with the reduction in the size of the heart. In one case of advanced aortic aneurism there was an insignificant rise of blood pressure; the pulse remained unchanged and the orthodiagram showed no alteration.

In one case there was a slight increase in pulse rate, doubtless due to the severe chronic nephritis which was present. In two cases the bath was given at 89.6 F., which probably explains the consequent rise of blood pressure, the same being accompanied by a lessening in the pulse rate.

The conclusion is therefore justified that in purely organic cardiac affections the pulse rate and blood pressure sink in accordance with the reduction in the heart's dimensions, if the oxygen baths are given at 95 F.

BENZOL.

Benzol Therapy. From a study of their own case and the cases reported, Myers and Jenkins[3] draw the following conclusions:

Benzol is a valuable addition to the therapy of leukemia of any kind. Its institution is, however, so recent, and clinical experience with it is still so scanty, that definite conclusions as to its intrinsic value should be held in abeyance. It would seem to have no uniform action; in all cases it reduces the white cells, but in some,

(3) Albany Med. Ann., July, 1913.

apparently those with very high counts, it does not reduce the leukocytes to normal, while in cases of 100,000 to 200,000 it may give brilliant results with normal white counts, greatly diminished or normal spleen, distinct gain in weight and strength, and loss of fever. On the other hand, we may have paradoxic reactions with falling white counts and gain in strength with no change in the spleen; or we may find decrease of the spleen with persisting high leukocytic counts, or these may be low counts with many pathologic leukocytes, or there may occur sudden leaps in the number of white cells. The red corpuscles and the hemoglobin are as a rule beneficially influenced. When Roentgen rays can be used in combination favorable results may be obtained, the blood returning to normal with no persisting myelocytes.

It is probable that the results of benzol therapy are variable for two reasons: (1) the cases in themselves vary in intensity and in the fundamental pathologic conditions or etiologic factors in the bone-marrow, the spleen or lymphoid system. (2) The results are in some way dependent on the size of the dose of benzol, which dose may be either stimulating or depressing to the tissues involved and this dose may be peculiar in a marked degree to each case or individual. The authors therefore suggest that the effect of benzol should be carefully checked by daily blood examinations so as to gauge the optimum dose, and to forestall any symptoms of benzol poisoning.

Benzol in Leukemia. Rösler[4] reports two cases in a man and a woman in the thirties, the first with 200,000 and the other with 237,000 leukocytes. Under benzol treatment, after a brief increase in the number to nearly 340,000 and 420,000, respectively, the blood picture began to improve as also the general condition, and the patients now regard themselves as clinically cured but the period has been short. During the course of the benzol treatment there were occasionally sensations of oppression and smarting in the stomach, and the patients lost appetite for a time, but these by-effects speedily subsided under appropriate measures.

(4) Wien. klin. Wochenschr., May 22, 1913.

Benzol in Myeloid Leukemia. Jespersen[5] reports a case of very severe myeloid leukemia in a man of 32. The condition was rebellious to all measures, including 100 exposures to the Roentgen rays. When the benzol treatment was begun the man was extremely emaciated and entirely helpless, with fever and hemorrhages. On the tenth day, the number of leukocytes had dropped from 250,000 to 61,000 and the general condition showed marked improvement. The leukocytes dropped finally to 5,000 while the reds had increased from 2,000,000 to 3,500,000 and conditions gradually righted themselves until the man considered himself cured and returned to business. It is possible that the preceding radiotherapy may have prepared the way for the benzol. The prompt and remarkable improvement under it did not last long. Then the disease flared up again, the leukocytes ran up to 750,000 and the pernicious type of red corpuscles made their appearance. The patient died the twenty-third day after recurrence of symptoms. The dosage of benzol had never been over 5 gm. a day.

Benzol Poisoning in Myelogenous Leukemia. A case of true myelogenous leukemia with 56,000 leukocytes to the cubic millimeter but enormously enlarged spleen was treated by W. Neumann[6] with benzol according to the recommendation of Koranyi. The drug was given in doses of 0.5 gm. in gelatin capsules, diluted with an equal amount of olive oil, beginning with one capsule twice daily and increasing to two capsules four times a day. After the first dose there were chill and high fever but the subsequent doses were well tolerated. The number of white cells diminished rapidly but no particular form of cell was affected more than any other. The splenic tumor decreased in size and the general condition of the patient improved. After treatment lasting thirty-six days there were only 5,300 white cells and the spleen was reduced to one-half its former size. The patient felt well in every way. Unfortunately, the effect of the drug continued after medication was stopped. The leukocytes dropped to 200, diarrhea, fever and profuse epistaxis

(5) Hospitalstid., Feb. 12, 1913.
(6) Therap. der Gegenw., February, 1913.

appeared and finally a hemorrhagic stomatitis and rhinitis set in. The patient died thirty-eight days later and at autopsy the lesions of benzol poisoning and not those of leukemia were found. Benzol seems to be of value in leukemia but great care is necessary in its use. The drug should not be given too long but should be discontinued as soon as the white cells show a tendency to diminish in numbers.

OX BILE.

Ox Bile in Treatment of Hyperacidity. F. W. Palfrey[7] believes that there is reason to suspect that in hyperacidity and in gastric and duodenal ulcer the symptoms are at least in part due to delay in the neutralization of the acid contents discharged into the duodenum. The administration of ox-bile pills (salol coated) by mouth theoretically should correct this fault. Empirically, such administration of ox bile has seemed to be of service in the relief of pyrosis and pain after eating; it has been followed by improvement in cases of gastric and of duodenal ulcer.

The treatment was as follows: A general diet list was given merely to avoid clearly unsuitable foods; this list was regarded by the experienced patients as a generous one. A caution against overeating was given, and stress was laid on thorough mastication to insure prompt action on the food by the gastric juice. The ox bile was given in pills prepared according to the directions of Pfaff, each containing 0.25 gram of dried and pulverized ox bile, salol coated to conceal the taste and to prevent dissolution in the stomach. Two or three of these pills were given after meals three times a day for a week, after which, as a rule, the number was reduced. In some instances in which the appetite was not good, or in which there was other reason to suspect that the gastric secretion was not always active, dilute hydrochloric acid and tincture of nux vomica, of each 8 minims, were given in water before meals, and for temporary relief sodium bicarbonate and milk of magnesia were recommended to

(7) Am. Jour. Med. Sci., June, 1913.

the few patients not already familiar with them. Aside from these measures, and laxatives, when needed for constipation, the daily life of the ambulatory patients continued as before, and in the less numerous cases in bed on account of hematemesis or other severe symptoms as little other treatment was given as possible. The results of this treatment were such as to lead Palfrey to the belief that they could not be explained by the general directions given, but must be laid to the influence of the bile. In practically all cases followed the patients described a satisfactory improvement beginning within a few days, and at the end of a week or ten days gave a highly favorable report of their condition.

BISMUTH.

Symptoms of Bismuth Poisoning. From the cases reported, Warfield[8] says, we can deduce a rather typical picture which differs from the poisoning of lead and of mercury.

There are three stages: (1) Benign, in which the violet-black line is the only manifestation; (2) moderately severe, in which there is stomatitis, more or less acute, to which succeeds a chronic stomatitis characterized by discoloration of the gum margins and tattooing of the mucosa which extends to the buccal cavity; (3) a severe form characterized by a longer duration of the stomatitis, the margins of the gums and tattoo-like plaques ulcerate, secondary infections supervene, and general symptoms as fever, hiccough, vomiting, diarrhea, and albuminaria occur.

Prodromal symptoms are slight, or, if present, there are only malaise, slight salivation or tenderness about the mouth. There soon follow the line on the gums or tattoo plaques and ulcerations on the buccal mucosa. The bismuth line occupies a part or all of one or both jaws. It resembles the lead line but differs from it because of its really violet tint. In benign cases the gum margin is not swollen. In severe cases there may be swelling, ulceration, and loosening of the teeth. Cessa-

(8) Amer. Jour. Med. Sci., November, 1912.

tion of the bismuth treatment brings about improvement, but the gums retain the discoloration for some time.

The line on the gums is usually the first symptom of the poisoning, but occasionally there are plaques in the buccal mucosa like tattoo marks. The bismuth plaques may be found anywhere in the mouth but show preference for sites where the teeth and gums come in contact and the first plaque is often at or near the opening of the duct of the parotid gland. The ulceration is more apt to occur at this situation. The sides of the tongue are also frequent sites of ulceration.

The color is the same in all, a violet black. The lesions rarely appear insidiously, but are usually preceded by salivation and erythematous stomatitis. At times the lesions come on rapidly with edema.

The spots may be simply small areas of bluish violet-black color, in severer cases there is some swelling and a diphtheritic white membrane in the center. This is characteristic of bismuth. In very severe cases gangrene occurs with resulting loss of substance.

The breath is usually foul, depending on the state of the lesion.

The spots appear simultaneously or in crops. They cause more or less functional disturbance and thus tend to weaken the patient. Mastication may become impossible. The swollen and painful tongue may with difficulty be protruded. Ulcerations on the soft palate and tonsils may cause hoarseness. Salivation is marked and when healing of ulcers begins the saliva may be so tenacious as to interfere with swallowing. The patient in these severe types naturally emaciates, and there is often fever due to secondary infections. There also may be dysphagia, vomiting, and diarrhea. The urine may even be blackish and frequently contains bismuth. Occasionally albumin and casts are present. These symptoms are produced by a pure bismuth salt. They are not the result of impurities, such as lead, arsenic, or antimony.

Bismuth Salts and Their Uses. Lion[9] has shown that when bismuth subnitrate is given to patients with excessive gastric secretory activity, either an hour before

(9) Paris Méd., June 7, 1913.

or during a meal, the drug diminishes both hyperchlorhydria and pepsin formation, lowers the intensity of the digestive process in the stomach, and leads to rapid evacuation of this organ into the intestine. A high degree of total acidity still remains, but this is due in large measure to nitric acid set free from the bismuth salt. The dose advised by Lion for these cases is from ten to twelve gm. The drug may also be given five or six hours after the meals, for the purpose of precipitating the chlorine of the stomach contents and placing the organ under conditions in which there is a more marked tendency toward its evacuation. In *x*-ray work Lion disapproves of the use of both the subnitrate and the carbonate of bismuth, owing to the danger of bismuth intoxication, and has had prepared an oxide of bismuth which is tasteless, readily emulsifiable, becomes changed to an insoluble oxychloride on contact with the gastric juice, and is not absorbed into the blood; all risk of either nitrate or bismuth intoxication is thus avoided.

BROMIDE.

Preparations of Bromide. R. Ammonn[1] states that bromide is the safest and most harmless of sedatives in spite of the many new remedies of this character. The practitioner orders it in nervous excitement, neurasthenia, and insomnia, and as an anti-phrodisiac. It is the only reliable remedy for repelling the attacks of epilepsy; it also decreases the reflex excitement of mucous membranes, and is therefore used by dentists and laryngologists, and to allay night cough. Urologists also use it to diminish gonorrheal irritation, and to facilitate catheterism. The author does not believe that there is an effectual bromide preparation which will not cause skin affections or cerebrospinal bromism; because the essential action of bromide is by means of ionized bromide in the blood serum, and this affects the skin. The central nervous system becomes saturated, giving rise to cerebrospinal bromism. The preparations brought forward to replace bromide, which, it is asserted, produce no untoward bromidic results, are of doubtful efficacy.

(1) Deutsch. med. Wochenschr., June 5, 1913.

CAFFEINE.

The Toxicity of Caffeine. Salant and Reiger[2] tell us that the toxicity of caffeine in the rabbit varies with the mode of its administration, being least when given by the mouth and greatest by intravenous administration. The toxicity is about from 15 to 20 per cent. greater by subcutaneous injection than by mouth, but is about half of this when injected into the peritoneal cavity. No difference was observed in the toxicity of caffeine whether administered into gluteal or into the lumbar muscles. When introduced by this route the toxicity was found to be less by one-third than when it was injected into the peritoneal cavity, but is about 30 per cent. more toxic than the subcutaneous injection. White or black rabbits were found to be less resistant to caffeine than gray rabbits. The resistance of the guinea-pig to caffeine, as in the rabbit, is greatest when given by mouth. The minimum fatal dose is less by intraperitoneal injection, but greater than by subcutaneous injection, thus differing from the rabbit in this regard. Cats are less resistant to caffeine than guinea-pigs or rabbits. The minimum lethal dose by mouth in the cat is the same as by subcutaneous injection, but is less when given by the intraperitoneal route. The toxicity of caffeine for white mice varies according to season, being twice as toxic in the early fall as in the spring, when resistance to caffeine is about the same as that of the guinea-pig. But resistance of white mice to caffeine in the fall was less than that of animals of other species employed in the present research. The tolerance of the white rat for caffeine is about the same as that of the pigeon. No effect of season was noticed. The toxicity was the same whether caffeine was introduced into the peritoneal cavity, or into the subcutaneous tissues. The minimum fatal dose for dogs was found to be the same by mouth as by subcutaneous injection, and is almost the same as for the cat. The resistance of the pigeon to caffeine is very much the same as that of the herbivora, but it approaches more nearly the guinea-pig than the rabbit in this re-

(2) Jour. of Pharm. and Exper. Therap., March, 1912.

gard. The toxicity varies much more in different individuals when given by mouth than when injected subcutaneously. The toxicity of caffeine varies in the guinea-pig according to season, and this seems to be the case also in mice.

Age is likewise a factor in the toxicity of caffeine, young animals being more resistant than the full-grown and older animals. This was shown in experiments on rabbits, cats, and dogs. The symptoms of caffeine poisoning were also different in puppies and full-grown dogs. Diet such as carrots and oats did not influence the resistance of rabbits and guinea-pigs to caffeine. Low protein tends to decrease resistance to caffeine in dogs. Young growing dogs are less resistant to caffeine on a meat than on a milk diet.

Caffeine is not cumulative in the rabbit or dog, even if administered for a considerable length of time. A mild tolerance may be induced in the rabbit under certain conditions, but not in dogs under the condition of the experiments made in this investigation. The possibility, however, that dogs may acquire tolerance for caffeine is not excluded. Although the rabbit tolerates a much larger single dose of caffeine than the dog, it was found, in experiments on chronic caffeine intoxication, that the rabbit is less resistant to caffeine than the dog. The toxicity of caffeine is increased under some pathologic conditions, since comparatively smaller doses proved to be fatal to rabbits, cats, and dogs, when marked lesions not due to caffeine were found at autopsy. Glycosuria was observed in rabbits, guinea-pigs, and cats when caffeine was given in sufficient amounts.

Action of Caffeine on the Circulation. The exact position of caffeine as a circulatory stimulant does not seem as yet to have been exactly determined by the medical profession. On the continent of Europe it is used much more frequently and in much larger doses than in this country or in England. Indeed, in Russia and in France it seems to be not uncommon to give as much as from 5 to 15 grains at a dose, if we can believe some of the text-books which are published in those countries. In this country, the dose is rarely greater than one or two

grains four or five times a day, and very commonly is not more than one grain three or four times a day.

Within the last few years the attention of the public has been called to the influence of caffeine on the body in general, chiefly with the idea that it is a deleterious substance, but the careful investigations of many competent men during the last five years have shown that in moderate quantities it is harmless to the great majority of individuals, and its wholesale ingestion in one form or another by a large proportion of the human race, civilized and uncivilized, living in countries scattered from the tropics to the poles, over many years would seem to indicate that this universal experiment, crude though it be, strongly indorses the necessarily more limited but more accurate studies in the laboratory and at the bedside.

At a recent meeting of the American Society of Pharmacology and Experimental Therapeutics, Salant[4] reported the results he had obtained from the intravenous injection of caffeine into dogs, using a single dose, which was equivalent to the administration of from 3 to 12 grains of caffeine to a man weighing in the neighborhood of 150 pounds. He states that when given to an animal with a normally-acting heart this dose has a stimulating effect, but larger doses in the presence of disturbed heart action may act as a cardiac depressant. He also found that when caffeine was administered simultaneuosly with or immediately after 10 to 20 per cent. of alcohol, the depressant effect of the latter drug was corrected by the caffeine in the majority of instances, and also that the frequency of the cardiac contractions was increased without changing their force. Salant also found that doses of caffeine amounting to 30 grains or more to a man of 150 pounds, when injected into the stomach, had no effect on the heart, although cardiac depression was observed when such doses were introduced into the intestine.

There are several points of interest in connection with these experiments. In the first place it is a nice question as to whether the use of a dog for studying the action

(4) Therap. Gaz., June, 1913.

of caffeine is a happy choice, since in general terms carniverous animals can scarcely be considered as approximately equivalent to omniverous animals, which animals, like man, use a vegetable as well as a meat diet. Assuming, however, that experiments on the dog are equivalent, and also remembering that as the dog is carnivorous, a vegetable poison might be expected to act on him more actively than on man, it will be noted that Salant's work proves conclusively that caffeine in the doses in which it is taken in this country is not depressant to the circulation. When it is considered that he injected into the jugular vein as much as is commonly taken in from 1½ to 6 cups of coffee, and found that a stimulating effect is produced, it is evident that when taken by the stomach, as man ordinarily ingests it, it can not be harmful, the more so as he found that when the equivalent of from 15 to 20 cups of coffee were injected into the stomach, the drug had no effect on the heart. In other words, the doses which he used on the dog, injected directly into the veins, may fairly be considered distinctly toxic in their size as compared to the dose used for medicinal purposes or in coffee drinking.

CALCIUM.

Calcium Gelatin Injections. The salts of lime have been very warmly recommended in hemorrhage, hemorrhagic diathesis, in exudative skin diseases, hay fever, bronchial asthma, rickets, osteomalacia and tetany. One great disadvantage has always been the impossibility of injecting the salts subcutaneously because abscesses and necroses invariably followed. A. Mueller and P. Saxl[5] found that when the calcium was injected dissolved in Merck's gelatin solution, no necrotic action occurred, and the beneficial effects of the gelatin, which in itself is a marked hemostatic, were also noted. The solution recommended contains 5 per cent. calcium chloride and 10 per cent. gelatin and the dose is 5 to 10 c.c. Before injecting, the vial is placed for 10 minutes in boiling water and is then allowed to cool. Experimentally, the pronounced hemostatic effect of the solution could be demonstrated

(5) Therap. Monats., November, 1912.

on animals and the formation of exudates was also checked to a marked degree. As a rule, the intramuscular injection is to be preferred. The patients usually experience some pain for from 10 to 12 hours after the injection but on the following day, the site is generally painless and there is seldom any infiltration. The injections did good service in severe rheumatic hemorrhagic diathesis, in chronic bleeding from an ulcer of the duodenum, in gastric hemorrhage, in severe pleuritis, in Basedow's disease and severe bronchial asthma. When emphysema and marked bronchitis were present in the latter condition, the effect was less marked.

Dosage of Calcium in Spasmophilia. K. Blühdorn[6] reports his attempts in seventeen clinic cases and ten dispensary cases of spasmophilia to determine the most favorable dosage for the calcium salts. He was surprised to find that infants require very large doses, from 4 to 8 gm. calcium chloride in twenty-four hours at first, the dose then gradually reduced to 2 or 3 gm. The calcium salt in the non-crystallized form proves far more effective than the crystallized. He emphasizes that the action of the calcium salt is symptomatic and transient, so that it must be kept up until all the symptoms of the spasmophilic tendency have permanently subsided except the over-excitability to electric stimuli—this can not be permanently influenced in this way. In treatment of eczema, asthma and other affections in which benefit from calcium is anticipated, the method of large doses should be given a trial. To disguise the taste of the drug he generally prescribes it in the form of calcium chloride 10 gm.; anisated water of ammonia 2 gm.; acacia, 1 gm.; saccharin q.s. and water to 200 c.c. Of this mixture 10 c.c. is given six times a day, each dose representing 0.5 gm. calcium chloride. He dilutes the mixture to one-half when given by the rectum.

Calcium Sulphide. Referring to the Walker case of poisoning with bichloride of mercury tablets, it is interesting to note that Hayward and Allen[7] recommend calcium sulphide as an antidote. While it is true that

(6) Berlin. klin. Wochenschr., June 9, 1913.
(7) Jour. Amer. Med. Ass'n., May 31, 1913.

the white of an egg is the general antidote, and is of valúe up to a certain point, these writers bring out the fact that the hydrochloric acid of the stomach increases the solubility of the mercury salt, its solubility being still further increased by the presence of the citric acid added to the ordinary antiseptic tablets. Their comment on this subject, and especially anent the use of the calcium sulphide, is of particular interest, and is in part as follows:

"Mercuric compounds are acknowledged to be toxic even in small doses; mercurous compounds can be tolerated in much larger doses; hydrogen sulphide reduces mercuric to mercurous, whether the conditions are acid or alkaline, even in the presence of citric acid, a substance which inhibits many chemical reactions. Calcium sulphide (calx sulphurata, U. S. P.), 1 gm. of which is capable of reducing 2.31 gm. of mercuric chloride, hydrogen-sulphide water, natural or artificial, which can be tolerated by the stomach, and enemas of which may be administered without serious danger, will all act in this manner, first reducing the mercuric chloride to mercurous chloride and further to mercurous sulphide. On such grounds it would seem that the sulphides are the logical antidote for mercuric poisoning."

Hayward and Allen state that there have been in Detroit two instances of poisoning by the mercury antiseptic tablets. One of the patients died; the other was given calx sulphurata and was alive when their communication was written.

Influence of Lime Salts on the Constitution and Health. Emmerich and Loew[8] speak of the gradual recognition of the fact that not only bone and teeth, but heart muscle, glands, nervous system and brain, and so on throughout the sum of organs and tissues, all depend on lime salts for their best efficiency. Calcium has been shown by biologic reactions to be present in all cell nuclei. In fact the amount of calcium in the animal body varies directly with the nucleus content. Hence glands and lymph nodes contain an amount of calcium much greater than muscles, etc., because of the vastly

(8) Berlin. klin. Wochenschr., June 30, 1913.

increased number of nuclei. Calcium is therefore a sort of measure of cell activity, and the chief type of cell activity is connected with enzyme action. These properties are more readily studied in plant life but hold good as well for animal cells. Moreover, if we derive our lime from plant cells the knowledge of the latter becomes of special value. The authors have studied all forms of introduction of lime salts into the organism, and have learned incidentally that while a plain solution of lime chloride usually causes a marked gain in weight, it may exceptionally cause loss. In swine, albumin metabolism and nitrogen retention are promoted, but there is a decrease of fat accumulation. The first phenomenon may cause an initial increase in weight, but the second in time overbalances it. To apply the authors' finds to practice one needs only to quote Reinhardt, a recent student of the subject: "Neurasthenic, overworked, and physically depressed persons are so rapidly healed by the chloride of calcium solution, that they could not show sufficient gratitude. They felt as if newly born, full of the zest of life, stronger and more enduring than ever and twenty years younger." Similar results are claimed for dogs. In addition to the use of a solution of anhydrous chloride, of which the patient takes doses representing 1.59 gm. for a long period, the authors recommend a calcium bread and similar products. They believe that the proper use of calcium is the keystone of individual hygiene.

CAMPHOR.

Camphor in Pneumonia. H. Leo[9] recently reported excellent results in curing experimental pneumococcus infection by intravenous injection of a saturated aqueous solution of camphor. It acts in this way much more effectively than by subcutaneous injection in oil. Thirty-eight rabbits inoculated with pneumococci and then given an injection of 20 c.c. every hour of the cold solution lived much longer than the controls. He here supplements his article with the statement that Ehrlich and Bohncke found subcutaneous injections of camphor

(9) Deutsch. med. Wochenschr., April 3, 1913.

in oil effectual in protecting mice against pneumococcus infection.

Therapeutic Value of Camphor. The wide-spread belief in camphor as an efficient heart stimulant, and the great diversity of opinions as to the mode of its action and toxicology, led J. W. Head and R. C. Brooks[1] to a thorough clinical and experimental study of the drug. The chief purpose of these experiments was to give to the medical profession a more accurate knowledge in regard to the relative value of camphor as a therapeutic agent in urgent cases of cardiac depression.

A series of twenty-two cases was observed clinically. Among the patients on whom the experiments were tried, were (1) those whose circulatory apparatus was apparently normal; (2) those whose auricles were in a state of clinical fibrillation; (3) one patient with valvular disease but with normal rhythm; (4) patients with unclassified cardiovascular disease, chiefly affecting the myocardium and vascular coats.

Records of the pulse and the systolic and diastolic blood pressure were made at frequent intervals, the usual duration of the observations averaging about two hours.

In not a single instance was any evidence obtained as to the presence of subjective symptoms which might be attributable to the injection of the camphor, which was given in single or multiple doses of from 3 to 50 grains, by the subcutaneous or intramuscular method. Polygraphic tracings were taken in several of the fibrillation cases, before, during, and after the administration of camphor by the hypodermic method, but in no instance was there observed any alteration in the type of radial or venous pulse as the result of medication. There was no distinct sustained rise in blood pressure in any of the cases experimented on. One patient with an apparently normal circulation showed a fall of 17 m.m. systolic and 25 m.m. diastolic pressure seven minutes after the hypodermic injection of twenty grains of camphor in olive oil.

(1) Amer. Jour. Med. Sci., February, 1913.

Laboratory investigations by the same experimenters consisted in manometric blood pressure observations of unanesthetized animals, using the T-Cannula method. Normal animals (dogs) were taken as subjects. The laboratory experiments were in agreement with the clinical findings. Doses of camphor sufficient to produce slight muscular twitchings failed to cause any distinct rise in blood pressure or any increase of rate or amplitude of the heart beat in normal dogs.

Summarizing their experiments, Head and Brooks came to the following conclusions:

"In clinical experiments, camphor injected subcutaneously in doses as large as 50 grains failed to produce any definite results. The variations in pulse and blood pressure following the use of the drug were so inconstant as to make it probable that they had no relation to the medication employed. Camphor can neither be relied on as a cardiac stimulant, nor feared as a toxic agent in the doses employed by the experimenters and under the conditions studied."

The authors state, towever, that evidence is almost conclusive that camphor can restore the heart after poisoning by chloral, muscarine, strychnine and such other drugs as are thought to depress the irritability of the heart muscle. The authors also call attention to the fact that care should be exercised in the administration of camphor to those patients who have a poor glycuronic content. This condition may be suspected in cachexia, starvation, sepsis, eclampsia, carbon dioxide poisoning, etc. The probable reason for the greater toxicity of camphor under such conditions is the fact that the drug, when readily absorbed, is almost completely united with the glycuronic acid in the blood and is thus rendered inert. The variable fragment which escapes such combination may be excreted by the lungs, uncombined. This may be regarded as responsible for the physiologic action of the drug.

CARBON DIOXIDE SNOW.

Carbon Dioxide Snow in Hemorrhoids. As the histologic structure of nevi and hemorrhoids is almost iden-

tical, H. G. Anderson[2] decided to try the effect of carbon dioxide snow on the latter. The patients were put under gas, and the anesthesia prolonged for a few minutes by means of ether, while the crayon was applied with firm pressure to each hemorrhoid for twenty seconds. Out of five cases, two were successful; the others required further treatment. The author concludes that the treatment is suitable for small uncomplicated internal hemorrhoids only, and that it should therefore be applied only in selected cases.

Dosage of Carbon Dioxide Snow. Beclere[3] applies a thin sheet of cork, cut out over the lesion, to protect the adjoining tissues during the application of the solid carbon dioxide. He does not use it in the form of a pencil but in the form of melting snow contained in a small silver receptacle of a shape to fit exactly over the lesion. This ensures asepsis and permits more exact dosage, graduated by the time of application measured with a stop watch. The pressure is also graduated. The three factors for correct dosage, the temperature, the duration of the application and the pressure on the skin are thus entirely under control and dosage. Beclere's instrument for the purpose consists of the silver tube for the dioxide snow, inside a double sheath of hard rubber or cork. The bottom of the snow tube is a very thin sheet of copper or silver. A spring is arranged on the top of the tube, and as the instrument is pressed on the skin an index travels along a graduated line showing exactly the amount of pressure being exerted by the snow tube on the skin. The solid dioxide in the metal tube is melted by the action of ether, alcohol or acetone. The temperature is maintained at about the same point with either of these as in the solid form of the carbon dioxide. The acetone dissolves the dioxide a little more quickly than alcohol. All danger of blistering is averted by treating the spot after the application of the snow as if it were a fresh burn. The preferable technic for this seems to be to paint the region frozen by the snow with a saturated alcoholic solution of picric acid.

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(2) Brit. Med. Jour., 1912, vol. I, p. 120.
(3) Bull. de l'Acad. de Méd., Paris, May 13, 1913.

CHLORAL.

Chronic Chloral Poisoning. Wallace[4] describes experiments in which gradually increasing doses of chloral were given daily by stomach to dogs. As chloral is changed in the body to trichlor-ethyl-alcohol, and this unites with glycuronic acid, forming the inert urochloralic acid, it was thought that the formation of this combination would keep pace with the increasing amount of chloral given, and by means of this protective agency a tolerance be established. The results of the experiments may be summarized as follows:

1. The earlier doses of chloral produce vomiting, but later the stomach becomes tolerant to the drug and vomiting does not occur. This local tolerance is common in gastric irritants. When large doses, 5 gm. or more, are given daily, a gradually increasing looseness of the bowels results, which eventuates in a diarrhea. The chloral given, however, is absorbed.

2. So far as symptoms of depression of the nervous system are concerned, only a slight degree of tolerance is obtained. After doses sufficient to induce narcosis are reached, the gradual increase in dosage still brings about complete narcosis, but its duration becomes less. The tolerance of the nervous system is not marked therefore, and is comparable to that from alcohol.

3. As the dose is increased no change in metabolism, as measured by total nitrogen and urea, is seen, and the animal maintains a fairly constant weight. After daily doses of 5 gm. or more the ammonia rises, however, and may reach twice the normal figure. The urine gives no qualitative reactions for acetone, or diacetic or oxybutyric acid. Albuminuria finally appears. The urine contains no sugar.

4. The chloral excretion takes place through the kidney and was calculated quantitatively by the amount of organic chloride in the urine. The exact forms in which it is excreted, *i. e.*, the relative amount of free chloral, trichlor-ethyl-alcohol, etc., have not yet been determined. Calculated as chloral from the organic chlorides elimi-

(4) Jour. Pharm. and Exper. Therap., March, 1912.

nated, with small doses from 70 to 85 per cent of the chloral ingested is excreted within eighteen hours. As the dose increases this percentage increases slightly. A breaking up of the chloral molecule, therefore, does not occur.

5. The glycuronic acid excretion, as determined by the method of Tollens, runs fairly parallel to that of the chloral. Thus after a dose of 2 gm. chloral, 1.73 gm. chloral and 1.35 gm. glycuronic acid were excreted. After 8 gm. chloral, 7.21 gm. chloral and 6.21 gm. glycuronic acid were excreted. With the smaller dose, therefore, 0.75 gm. chloral and with the larger 2.6 gm. chloral were not paired with glycuronic acid.

It may be said in conclusion that although the change of chloral to trichlor-ethyl-alcohol and the pairing of this with glycuronic acid is of the nature of a protective mechanism, it cannot in itself bring about any marked tolerance for the drug, but rather is analogous to the power of the body cells to destroy morphine in cases of morphine tolerance.

CHLOROFORM.

Chloroform Toxemia. In an exhaustive article Nuthall[5] says that the conclusion of the whole matter, as it would appear from clinical experience and research, may be shortly stated thus:

1. Never administer chloroform if etherization be possible, even to children or pregnant women.

2. Avoid carbohydrate starvation, or any other form of starvation, before operation.

3. If chloroform must be used, administer dextrose or bicarbonate of soda freely for days beforehand, especially if the patient be young or his condition septic.

4. If post-chloroform poisoning develops, administer freely soluble carbohydrates (dextrose) and bicarbonate of soda, in the worst cases injecting the dextrose into the subcutaneous tissues and rectum, or even intravenously.

(5) Birmingham Med. Rev., November, 1912.

CHLORETONE.

Treatment of Epilepsy by Chloretone. Bentley[6] says that it will facilitate our conception of the therapeutic action of chloretone if we divide the symptoms which it produces into three stages. This subdivision is only an arbitrary one, and in practice the stages merge imperceptibly one into the other. Still the symptoms appear in the same order with such constancy that the subdivisions are warrantable. They are: (1) Dullness and drowsiness; (2) vertigo, with or without albuminuria; (3) stupor.

1. *Dullness and Drowsiness.* In treatment of epilepsy by chloretone, we must expect some slight degree of dullness and drowsiness, but if chloretone is continued in doses presently mentioned, this usually passes off as the patient becomes more accustomed to the drug. Occasionally this does not happen, but instead cumulative action results, and the second stage is reached. It is unusual for this latter result to manifest itself with smaller doses than 10 grains daily (speaking of female patients, who are not so bulky as men). This first stage may be accompanied by a complaint of neuralgic pains in the head or face. He does not place much reliance on this, as it is a subjective symptom, and, as the patients are mentally afflicted, their statements are not to be depended on.

2. *Vertigo.* The second stage is that of vertigo. At first the patient complains of dizziness, with perhaps weakness of the legs, and if chloretone is continued in the same doses, he may actually fall down from giddiness. This symptom of vertigo is of the utmost importance in the continuous administration of chloretone for epilepsy, and Bentley has little doubt that it holds good, no matter for what purpose the drug is prescribed. It is the danger-signal which we may reach, but if we pass it the result will be somewhat alarming symptoms of stupor in a varying degree. When he gave the drug in larger doses he frequently found patients suffered from dizziness, but at that time he had not fully appreciated

(6) Austral. Med. Gaz., December, 1912.

the significance and importance of this symptom. He has previously pointed out that the vertigo of epilepsy may be mistaken for vertigo produced by chloretone. If due to epilepsy it is sudden in onset and of transitory duration. If it is caused by chloretone it is most marked about two hours after taking a dose, and the effects last for several hours.

3. *Stupor.* The third stage, namely, that of stupor, is illustrated by a case of tetanus published by Hobbs and Sheaf in the *British Medical Journal* last year. The tetanus was of a severe type, and within five days 420 grains of chloretone were given. On the sixth day the throat was filled with mucus, which improved on the administration of atropine hypodermically. On the evening of that day the patient passed into a semi-comatose condition, from which he eventually made a good recovery. There is no mention of vertigo by these authors, but possibly the patient was too ill to express his feelings. These symptoms are placed before us, not with any idea of deterring us from using chloretone, quite the reverse, but that we may have a due appreciation of the symptoms to expect and be on the lookout for them should they appear.

What dose of chloretone should be prescribed, and when should it be administered? Although routine is not good treatment, Bentley advises beginning with a dose of either 3 or 5 grains daily, and continue this amount for a month, keeping a careful written account of the number of fits. If at the end of this time there is no improvement and no vertigo, the amount may be increased to 10 grains daily, which may be given in one or two doses. He does not recommend larger doses than this unless the patient be under supervision, and in any case it is well to warn the patient or his relatives in regard to dizziness. It will be observed that chloretone was given in doses of 10 grains every second day; in two of the cases the result was highly satisfactory. If the patient is in an institution treatment can be commenced with a daily dose of 10 grains, and if vertigo supervenes the quantity can be reduced. By this latter method the effect is more rapid than if smaller doses are given from

the first. If the patient is in status epilepticus, or having serial attacks, a single dose of from 30 to 60 grains may be given, and the result is highly gratifying, as chloretone—if we except chloroform—is by far the most powerful anti-convulsant we possess. The time of onset of fits must be the guide to the time of administration of the dose, but if the fits are equally frequent during the day and night, Bentley has a decided preference for giving the dose before bedtime. A point of practical importance is to prescribe it in capsules, as it is such a volatile substance that it rapidly disappears, especially in hot weather, if made up in ordinary powder papers. As it is put up in 3-grain and 5-grain capsules, this difficulty is easily overcome.

Comparisons of Bromide and Chloretone Treatment. In a previous paper Bentley gave a comparative table, and in almost all cases chloretone had a more powerful restraining influence on the seizures. Two of the cases which he showed had, presumably, long courses of bromide treatment before admission. One patient has had no seizures for over a year; the other is markedly improved, and the fits have almost completely disappeared. There is one point which he mentions with diffidence, and it is this, that he finds a better result from chloretone if he allows a period of, say, a month's interval between the stopping of bromide and the commencement of chloretone.

COBRA VENOM.

Cobra Venom Test in Syphilis. H. J. Fahrbach[7] reports the results obtained in 30 cases. Ten were cases of the severe secondary and tertiary type; 3 were nonspecific erythemas; 2 were of malignancy; 5 were cases under treatment; 15 were cases with a history of the infection of from 20 to 50 years ago, with no symptoms in the meanwhile. The test in the 10 cases of advanced secondaries and tertiaries was strongly positive, showing little or no hemolysis even in dilutions. In the 3 nonspecific erythemas, one was psoriasis, one erysipelas and one measles, the test was negative. In the malignant

(7) Kentucky Med. Jour., June 15, 1913.

conditions, one was a sarcoma and the other a carcinoma. In the sarcoma the Wassermann and the venom test were negative. In the carcinoma both the Wassermann and the venom were negative. The series of 5 patients under treatment gave some interesting and instructive results. Two of these had received the ordinary complete course of treatment and had shown negative Wasserman reactions for several months. The other 3 had received both arsenic and mercury medication and although they had not taken the full course of treatment the Wassermann test was negative in each. All of this series gave a decided positive result with venom. These 20 cases give results that have a direct bearing on the practical every-day treatment side of the question. This last series of 15 cases wakens a different interest.

Fahrbach has collected in the past three years 26 cases that give a history of having contracted syphilis from 20 to 50 years ago, having had the primary and secondary manifestations of the disease. There has been no evidence of the disease in the individual or his family since his treatment which was instigated at the time of the clinical evidence. Still 23 of the 26 showed a positive Wassermann. The authors have been able to test 15 of these cases with the cobra venom and in every instance the reaction was negative.

COCAINE.

Cocaine Poisoning. Bose[8] points out that the medicinal dose of the hydrochlorate of cocaine is from 1-5 to ½ gr. The minimum fatal quantities on record are ⅔ gr. hypodermically, from 12 to 15 grs. by the mouth, and 22 grs. by rectal injection.

A few cases have been recorded in European practice in which the drug either proved fatal or produced very severe symptoms when it was injected hypodermically or passed into the natural cavities prior to a surgical operation, or administered internally. In one case the injection of 3½ grs. into the breast of an adult woman was immediately followed by epileptiform convulsions, and in twenty minutes by death. In another instance

(8) Brit. Med. Jour., Jan. 4, 1913.

the hypodermic use of ⅔ gr. in a woman, aged 71, proved fatal in five hours. In the *Pharmaceutical Journal*, 1886 (iii, 16, 721), a case is recorded in which the hypodermic injection of 1-20 gr. caused dangerous symptoms in a girl aged 12 years. On Nov. 2, 1895, a case was reported in the *Lancet*, in which 2 dr. or a 10 per cent. solution of cocaine (representing 12 gr. of the drug) taken internally for the relief of a toothache caused death in twenty minutes, with epileptiform convulsions. In another case 1-100 gr. applied locally to the conjunctiva gave rise to dangerous symptoms; while in still another instance acute manifestations followed the injection of ½ dr. of a 10 per cent. solution—that is, 3 grs.—into the urethra. A rectal injection of 22 grs. of cocaine has been productive of death.

The prominent symptoms in all these acute cases of poisoning consisted of dryness and numbness of the mouth and throat, vertigo, dyspnea, failure of the special senses of sight, hearing, and smell; numbness of the extremities; rapid and feeble, sometimes irregular or intermittent pulse; muscular tremors, a staggering gait, dilated pupils; epileptiform, sometimes tetanoid convulsions; cyanosis, and insensibility.

The practical lesson to be learned from cases like these is the extreme care which is necessary in administering the drug for the production of local anesthesia in dental practice and surgical cases.

No case has yet been found in Indian medical practice, so far as Bose has been able to ascertain, of acute cocaine poisoning with a fatal result. In the twenty-seven years during which he has been connected with the chemical examiner's department in Bengal, he has had only three cases of fatal cocaine poisoning referred to him, all of which occurred within the past six months. Not only does this fact appear to indicate that the drug is very easily procurable by the common people, in spite of the strict regulations against it, but it also seems reasonable to infer that the people are getting more familiar with the uses to which the substance can be put.

COLLARGOL.

Action of Collargol Enemas in Septic Processes. W. Wolf[1] believes that the good effect of collargol enemata has beeen clearly demonstrated. He purposely waited after each injection until the next rise of temperature, so as to show more effectually the action of the remedy. When there was no question of the favorable effect of the treatment the enemata were given independently of the temperature every fifth day. That the intravenous injection of collargol was ineffectual in a case reported was probably due to the prompt development of a thrombus of the basilic vein, by reason of which a large part of the fluid was not distributed in the circulation. The author was put on his guard by this accident, and refrained from injecting the other arm of the patient. He also states that eight collargol enemata given his patient did not cause the least irritation of the rectal mucous membrane.

COLLOIDAL COPPER.

Colloidal Copper in Carcinoma. In a previous paper the authors—L. Loeb, H. N. Lyon, C. B. McClurg, and W. O. Sweek[2]—stated that by frequently repeated injections of colloidal copper they have been able to cause a retrogression in the majority of cases of carcinoma. In almost all the cases experimented on the condition had been inoperable. They now report further observations made in nineteen cases. Rapidly growing tumors, which lead to extensive metastases in the internal organs, and those in which cachexia is pronounced, cannot be benefited by the treatment, but in the large majority of all other cases which must be considered inoperable the injections cause gradual retrogression of the tumor; usually there is a marked diminution of pain.

In a number of cases, unfortunately, there is a gradual decrease in the effect of the injections, though in others the healing processes become perhaps more marked after the twentieth injection. The most important result of

(1) Deutsch. med. Wochenschr., May 15, 1913.
(2) Interstate Med. Jour., January, 1913.

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the investigations is that we now have the means at hand to cause a gradual, although only partial, retrogression of the large majority of inoperable cancers, provided they have not yet progressed to the last stage of the disease. The action is too slow, however, to render it probable that in most cases a cure will be accomplished by this treatment.

In two cases there was observed, as the first effect of the injections, a gradual springing up of granulations from the bottom of the ulcers. The proliferative energy of the connective tissue is very probably increased. The degree of response to the treatment varies somewhat in different cases; some show a very strong reaction, while in others it is less marked. The majority of human carcinomata are more amenable to the influence of colloidal copper than is mouse cancer.

CREOSOTE.

Uses of Creosote Carbonate in Pediatrics. Hunans[3] praises the action of this drug in loosening the secretions of the respiratory tract and states that it appears to him to have direct bactericidal properties. In pneumonic processes in children he has often seen the temperature fall from 1 to 1.5 degrees C. (1.8 to 2.7 degrees F.) after a single dose. The drug should be continued at increasing intervals until the temperature has returned to normal. Even such serious general symptoms as somnolence and delirium are favorably influenced, notably in cases of broncho-pneumonia. Obstinate cases of chronic bronchitis are often also greatly improved by creosote carbonate. A frequently useful property of this drug is that of increasing the appetite. Up to the age of 1 year the author gives 5 drops, or 0.5 gm., of creosote carbonate three times daily; up to two years, 10 drops, or 1 gm.; in the third and fourth years, 15 drops, or 1.5 gm.; in the fifth and sixth years, 20 drops, or 2 gm., and in the seventh to the tenth years, 25 to 30 drops, or 2.5 to 3 gm. The drug should be continued in doses one-half as large as those previously administered for a week after the auscultatory

(3) Med. Klinik, Sept. 29, 1912.

signs have disappeared. Children readily take it in a spoonful of warm milk. It is to be remembered that the urine may show an olive-green tint during its administration.

Creosote in Tuberculosis. In chronic, sluggish, afebrile cases of tuberculosis, says M. Fishberg,[4] especially those characterized by profuse expectoration, the patients are often greatly benefited by creosote, intelligently administered. There is frequently a striking improvement in the digestive functions. Fermentation in the stomach and intestines is diminished, and the bowels may be urged to act without cathartics. Many cases of dyspepsia in the tuberculous are cured by administration of creosote. An increase in weight occurs, and this has an excellent psychic effect on the patient.

Another sign of tolerance of creosote is a diminution in the amount of expectoration. Purulent sputum with a disagreeable odor often disappears and is replaced by odorless mucous material. The cough is greatly ameliorated, and the non-tuberculous bronchitis, tracheitis, and laryngitis frequently met with among consumptives are cured.

In fibroid phthisis, characterized by profuse expectoration of pus, creosote is frequently the best remedy. Cavities often dry up, at least temporarily. Large doses are not at all necessary; from 3 to 5 drops (0.18 to 0.3 c.c.) three times a day, given over a prolonged period, produce good and frequently lasting results. A good product must, of course, be obtained. The author has lately used creosote carbonate almost exclusively, and is under the impression that it is more easily tolerated than creosote. It can be given in doses of from 15 to 25 drops (0.9 to 1.5 c.c.) a day.

DIET.

Oatmeal Diet in Diabetes. Wolff[5] regards the oatmeal diet as a great advance in the dietetic management of diabetes, as time has revealed that the benefit is not from the oatmeal especially, but that practically

(4) Amer. Pract., September, 1912.
(5) Med. Klin., May 18, 1913.

any gruel has the same effect. He gives the details of five cases, in some of which he found a potato gruel very beneficial. By the use of various gruels, it is possible to vary the diet palatably, especially when inulin is added or interposed. The soup form of the food is of great importance as also the advisability of preceding the flour soup with vegetable days for reasons which he enumerates. In the case of a woman of 42 with glycosuria for six years, on abstention from meat the sugar in the urine dropped from 14.3 gm. to zero; then on 150 gm. oatmeal twice, the three following days 3.8, 10.5 and 5.8 gm. of sugar appeared in the urine, with traces of acetone. Then two equivalent amounts of wheat flour were given and the sugar and acidosis disappeared, but returned again after two oatmeal days, and the sugar kept at about 5 gm., notwithstanding the strictest abstention. Then equivalent amounts of potato-flour soup were given and the sugar ran up from 6.5 to 19 gm. the first day and then dropped back to below the first figure, and by the fourth day the urine was entirely free from sugar. In two other severe cases oatmeal and inulin seemed to be borne better than the potato soup. He relates the details of dietetic treatment along these lines in four other cases to sustain his views.

Research in the Diet of Diabetes Mellitus. B. Tausz[7] says that Abderhalden's researches have proved that albumin, fat, and carbohydrates develop protective ferments. Abderhalden and, independently of him, Weinland have shown that when cane sugar is added to the serum of a dog the cane sugar remains unchanged; but if the animal first be given 10 c.c. of a 5 per cent. cane-sugar solution intravenously, and the cane-sugar solution added to its serum when drawn, a splitting up of the di-saccharides follows at once, and this process of splitting is not temporary but continues for about three weeks. As a result of this, it is found possible for the organism to produce protective ferments against the prevalent action of carbohydrates. In diabetes, the system is overstocked with carbohydrates, and were it possible to make the protective ferments active, or perhaps

(7) Med. Klin., June 8, 1913.

increase them, the carbohydrates might be oxydized to a greater extent. The carrying out of this idea is now in progress.

Dietetic Treatment of Gout. A. E. Garrod[8] discourses at some length on the conceptions which exist as to the relation of food to the disease, and with regard to diet remarks: "There are certain general principles which must be conformed to if we are to do the best for our patients." The food should be adequate in amount, the main classes of foodstuffs should all be represented, there should be preferably some restriction of the proteins; the food should be well, but plainly, cooked, and digestible. Twice cooked, rich, and highly seasoned foods should be excluded. Foods rich in purins should be forbidden, and wines and beers avoided. Lastly, the dietary should be adapted to the individual needs of each patient, taking into account any complicating factors. If these main requirements are fulfilled, the regulation of the details may be left in the hands of the individual prescriber. He expresses doubt as to whether we achieve so much as we think we do by dieting gouty patients. Garrod finds it "hard to find any scientific basis for the distinction so generally drawn between red and white meats. Any special claims of the latter rest, presumably, on their readier digestibility."

Purin Content of Food in Gout. Recent research has demonstrated, says O. Minkowski,[9] that uric acid can be found in the blood in normal conditions, even on a diet free from purins. The mere discovery of uric acid in the blood on a purin-free diet does not necessarily mean gout. The proportion is much larger in those inclined to gout. This accumulation of uric acid is not due to simple exaggeration of the production of uric acid; when this occurs there is always a larger uric-acid output in the urine. In gout the urine does not contain an abnormal proportion of uric acid, and it seems as if the endogenous production of uric acid were rather below normal than above. The trouble seems to

(8) Lancet, June 28, 1913.
(9) Med. Klin., May 18, 1913.

be retention, and the question is why the abnormally large proportion of uric acid in the blood is not passed out through the kidneys. The kidneys seem to be impermeable for uric acid alone; gout is not uremia. The assumption seems inevitable that either the uric acid itself has become modified in its physical or chemical properties, or else certain metabolic processes which govern the fate of the uric acid have become modified—the trouble does not seem to be in the kidneys themselves. Treatment, therefore, should aim to reduce all the metabolic processes in general to a lower plane, and thus in this way act attenuatingly on the metabolic process assumed to be responsible for the gout. This should be supplemented by excluding from the diet the purin bodies which have been recognized as the source of gout. Minkowski says that the purins in coffee, tea and cocoa are in a methyl compound which does not become transformed into uric acid. These beverages may at most increase transiently the uric-acid content of the urine by their diuretic action, thus sweeping out a certain amount of the previously retained uric acid. There is no reason for prohibiting these beverages in gout solely from the standpoint of uric acid. Boiled meat contains less purin bodies than roast, but fish does not differ materially from meat in general in this respect. Small fish contain more purins than beef and pork. In conclusion he calls attention to the fact that proteins form what may be called an acid diet, that is, anions (sulphuric acid and phosphoric acid) are generated among the resulting products, while vegetables constitute more an alkaline diet, and these facts are not without influence in the management of gout.

Dietetic Treatment of Certain Forms of Chronic Diarrhea. C. Wegele[1] calls attention to the treatment of diarrhea with milk, stating that with from three to seven liters of milk daily no improvement may result in severe forms. It occurred to him that in such patients raw fruits might bring about better results than milk alone. It was van der Scheel who conceived the idea of a combination of lukewarm milk with straw-

(1) Med. Klin., June 1, 1913.

berries pressed through a sieve—one part of juice to three of milk. With this Wegele brought about good results. Besides the mixture he allowed only crackers and two eggs daily. Later, milk broth, whole strawberries, and from three to four eggs daily were permitted. About three pounds of strawberries were used in the twenty-four hours. In a few days the patient's general condition suddenly changed for the better. The stools became formed, their permeating odor decreased and, above all, the prostration and stupor, which gave the picture of auto-intoxication, became less from day to day. It has not yet been shown how the strawberries cured, though they are said to possess a certain enzyme which greatly promotes digestion. Boiling or sterilizing the fruit deprives it of its healing power. Bananas, peaches, mellow pears, melons, and cucumbers may be used, but are not so efficacious as strawberries, especially in the early part of the treatment. Gradually the patient was allowed puree of light vegetables, etc.

DIGITALIS THERAPY.

Effects of Digitalis, Squills and Strophanthus. A. R. Cushny,[2] of London, who has made a study of the effects of tincture of digitalis, squills and strophanthus, writes that he has always obtained the best therapeutic results from maximum doses, although it is possible to keep up the effect with smaller doses. In most cases the improvement of the circulatory organs is accompanied by loss of appetite, headache, nausea, vomiting, and often diarrhea. Digitalis, strophanthus and squills may give rise to all these symptoms, yet it seems as if the latter two are more prone to give rise to intestinal derangement than is digitalis, but they are followed less often by headache and nausea. The emetic effect of all three is probably of central and not of peripheral origin. The drugs were tested very accurately in the following way: A typical case of auricular fibrillation with tachycardia was selected and the preparation to be tested given until the pulse dropped to 65. After from 10 to 14 days tachycardia was again present when the

(2) Berl. klin. Wochenschr., April 21, 1913.

second preparation was given in the same way. The proportional therapeutic efficiency of the preparations was as follows: Tincture digitalis 1, tincture squills 2, tincture strophanthus 2 (this applies to the preparations of the British Pharmacopeia). The best effects were always seen in auricular fibrillation, and the general condition of the patient always improved as the pulse slowed. In cases of auricular fibrillation in which digitalis does not cause a slowing of the pulse the improvement is not so marked. In 13 out of 16 cases of auricular fibrillation, digitalis had the desired effect. The best results are seen in cases in which there is a history of rheumatism, particularly in young individuals. Digitalis does not act nearly so well when fever is present or when there are advanced degenerative changes in the heart muscle, as in the aged. Though the auricle may continue to fibrillate as before, the pulse becomes much more regular than before treatment. If too much digitalis is given, the pulse may drop to 40 or 50, and the so-called bigeminal pulse may appear. The first beat here will start from the bundle of His and the second from some portion of the ventricle. Cushny states that the slowing of the pulse caused by digitalis is not due to an increase in the inhibitory action of the vagus, for if atropine is injected during the period of slowing there will only be a slight increase in the rapidity. It seems as if digitalis acts directly on the heart muscle, though it is as yet impossible to say if the tissues affected are the bundle of His or the ventricle. Strophanthin intravenously slows the pulse in from 3 to 4 days as much as digitalis in from 7 to 10 days, but this slowing is also apparent if atropine is injected at the same time. In cases other than auricular fibrillation the effects of digitalis medication are not nearly so pronounced. The patients certainly improve, but it is questionable if this is not due to the rest in bed. A slowing of the pulse is apparent in only 30 per cent., and this does not go hand in hand with an improvement in the general condition, as in auricular fibrillation. If the administration of digitalis is continued here, sinus arrhythmia or heart block eventually result. The drug

in these cases acts on the auriculo-ventricular bundle and probably also on the inhibitory apparatus of the vagus, for in many cases the arrhythmia can be corrected by atropine. In a few cases of quite regular rhythm, digitalis itself gave rise to auricular fibrillation. In none of the cases treated with digitalis could a diminution of the size of the heart be detected, even when the improvement in the pulse and the general condition of the patient was all that could be desired.

The Action of Digitalis. The irregular action of digitalis in cardiac insufficiency is well known. In many instances the effect is very evident in that the subjective symptoms vanish, the amount of urine excreted increases and the amplitude of the pulse becomes higher, while the frequency falls. Digitalis usually shows this desired therapeutic effect in the weakened condition of the heart muscle, which has developed subacutely within a few weeks in mitral lesions and arteriosclerosis, and which is accompanied by dyspnea, enlargement of the liver, and edema.

In other cases, the toxic effects of the drug are evident only too early; the pulse becomes excessively slow after a few doses, or nausea appears too soon. In a third series the drug seems to be altogether ineffectual. Excluding the hopeless, final stage of heart disease, this is seen particularly when only one chamber of the heart is insufficient. Thus, in the weakness of the right ventricle of pronounced mitral stenosis, tricuspid lesions, emphysema or kypho-scoliosis, usually accompanied by extreme stasis of the venous system and in the rapidly developing insufficiency of the left ventricle, or pure or nearly pure aortic insufficiency with pronounced dyspnea and no venous stasis, there will generally be little or no therapeutic effect. The same applies to severe over-strain of the heart, acute cardiac diseases after infections, and the cardiac insufficiency of obesity.

Finally, there are cases in which the effect is all that can be desired, but in which the free flow of urine is soon checked, while the pulse remains slow and strong. Here, combination of digitalis with one of the diuretics of the purin group (diuretin, theocin) is often indicated.

Prof. Ernst Romberg[3] of the University of Munich discusses the interesting question whether the cardiac rhythm will explain the varying behavior of digitalis in all these cases. It has been known for some time that the drug exhibits its best effects in the so-called perpetual arrythmia seen so often with mitral lesions and usually caused by a fibrillation of the auricles. In a large percentage of cases of "auricular fibrillation" the pulse slows very promptly after digitalis medication. The disturbance of the rhythm as such cannot, however, be responsible for the brilliant therapeutic results, for in the perpetual arrythmia of arteriosclerosis and coronary sclerosis the effect is not nearly so satisfactory. The same may be said in reference to extra-systoles. In incipient cardiac insufficiency, they generally disappear after digitalis, but in the purely nervous and much more distressing forms, relief is usually not experienced from this form of medication. It may therefore be safely stated that the type of arrythmia does not explain the action of digitalis.

It is of greater importance to observe the rhythm carefully while the drug is being given, if undesirable after-effects are to be avoided. A slowing of the transmission of impulses from auricle to ventricle will generally contra-indicate further medication, since digitalis lowers the conductivity in the auriculo-ventricular bundle. The true bigeminal pulse seen so often in perpetual arrythmia of mitral lesions is also a sign that the patient has had enough digitalis. Similar disturbances of transmission which may be present before the drug has been given do not contra-indicate its use, however, for the transmission of impulses through the bundle may be improved if the heart action becomes more satisfactory.

It seems that the dynamic condition of the heart muscle is of greater importance than the character of the arrythmia. The best effect is therefore seen in severe circulatory disturbances. But the drug is also indicated in the earlier stages of cardiac insufficiency. Rest and dietetic measures will often accomplish the

(3) Münch. med. Wochenschr., Jan. 7, 1913.

desired result here, but with digitalis the patient will improve much more rapidly. The dyspnea on exertion, the slight swelling of the ankles in the evening, and the disagreeable oppression in the chest will often disappear promptly. Excellent results are also seen in the persistent bronchial catarrhs which are hardly influenced by expectorants. When no improvement follows, the case should be studied carefully to make more sure that the proper indication for the use of digitalis is present. Thus, nothing can be expected in disturbances resulting from defective nutrition, in cerebral arteriosclerosis, in thyreotoxic conditions, or in functional neuroses. Digitalis is also out of place in fully compensated heart lesions.

The poor results seen in some cases are probably to be explained by the fact that digitalis, while it increases the work done by the heart, can not increase the supply of energy so that a pressure, higher than before, can not be overcome. In this way the failure of the right ventricle to overcome the increased pressure in the pulmonary circulation in mitral stenosis can be understood. It is also likely that a more careful study of the elasticity of the heart muscle with digitalis will clear up many problems.

In all cases, the condition of the arteries must be investigated. In all probability, the lumen of the peripheral vessels is not altered by the drug. The intestinal vessels are probably contracted with fair doses, while the renal vessels dilate. The latter are rendered more sensitive in the presence of renal disease, and the dilatation is always much more marked in diseased than in normal kidneys. A vaso-constrictor action may occur, however, with large doses of digitalis and in acute stasis of the renal vessels. The use of diuretin in many of these cases will again start the free flow of urine.

The choice of a proper preparation is of the greatest importance in obtaining the desired effect. The infusion, if brought directly into the intestines, will act more promptly than the powder. In the stomach it causes considerable irritation, so that the powder here acts more promptly. Some preparations, like digipura-

tum, are freed from most of the principles which irritate the stomach, hence are passed into the intestines more quickly and are absorbed more rapidly.

According to some authors, digitalis does not act properly where it is apparently indicated, because absorption in the portal system is much delayed owing to severe congestion. In such cases the intravenous injection of strophanthine is often followed by prompt relief. To avoid a cumulative effect, from 10 to 14 days should be allowed to elapse since the last digitalis medication, and the initial dose should be small (0.25 milligram). The dose may be repeated no sooner than after 48 hours, and if necessary as much as 0.75 milligram may be employed.

In every case of heart disease treated with digitalis the medication should be discontinued from time to time to avoid a cumulative effect. A cumulative effect is common to and characteristic of all potent extracts, and an absence thereof probably means that the preparation is feeble in action.

Emetic Action of Digitalis Bodies. The opinion has been held that the nausea and vomiting which sometimes follow therapeutic doses of the digitalis bodies are due to their direct irritant action on the gastric mucous membrane. Analysis of the literature by Eggleston and Hatcher[4] shows that this opinion is based on deductions, and not on experimental evidence obtained with therapeutic doses. This is wholly apart from the recognized fact that massive doses of these bodies applied directly to the gastric mucous membrane do cause irritation.

All the digitalis bodies are capable of causing nausea and vomiting when moderate doses are introduced into the circulation of the cat and dog, the amount required in some instances being far less, actually, and relatively in proportion to the weight of the animal, than are those which have been used therapeutically in a single day. The nausea and vomiting in these cases are due to an action on the vomiting center in the medulla. Only traces of digitoxin or the fixed oil of digitalis are found

(4) Jour. Amer. Med. Ass'n., Feb. 15, 1913.

in the galenical preparations, and they exert no appreciable effect on the stomach after the use of therapeutic doses.

We have no means at present of securing the cardiac actions of the digitalis bodies without subjecting the vomiting center to the influence of these agents at the same time, and there is no advantage in substituting one mode of administration, or one member of the group, for another. The employment of opium to prevent the gastro-intestinal symptoms of the digitalis bodies in ordinary cases masks the appearance of toxic symptoms which should serve as a signal for the reduction of the dose.

DIONIN.

Dionin in Chronic Atrophic Rhinitis and Chronic Dry Pharyngitis. The seemingly wonderful results accomplished by the use of dionin in diseases of the eye led D. D. Wilcox,[5] of Petersburg, Va., visiting oculist and aurist to Petersburg Hospital, to employ dionin in treatment of a case of chronic atrophic rhinitis and in a case of chronic dry pharyngitis.

The atrophic rhinitis was well developed in a young girl 18 years old. She stated that the trouble had been noticed about two years and had gradually become worse. Wilcox three times a week cleansed the nasal membranes and post-nasal space of all dried tenacious secretions, and then thoroughly sprayed the parts with a 2 per cent. dionin solution. The girl was also given a spray of boric acid to be used three times daily at home. In addition she was given strychnine, phosphoric acid, and iron for her general condition. The first effect of the dionin was just as is seen in the eye, producing a well-marked edematous appearance of the entire mucous surface. This, she said, lasted the entire night and, as she expressed it, made her have a bad cold without having to blow the nose. It was with difficulty that the writer persuaded her to let him continue the treatment, she preferring the large breathing space to the obstruction.

(5) Virginia Med. Semi-Monthly, 1912.

He is now able to report the case as cured after three months of ceaseless treatment.

The case of dry pharyngitis was in a man of 45. The dionin was applied on a cotton application every other day for a month. When seen a short time afterward, he said that his throat had never since troubled him.

DIURETICS.

Diuretics in Experimental Nephritis. When the convoluted tubules are put out of action by uranium nitrate, Boycott and Ryffel[6] found, contrary to expectation, that caffeine excites the secretion of urine, and equally with Ringer's fluid or 5 per cent. salt solution is an effective diuretic. In any case in which a "secretory" diuretic has failed, and where the one sort has been effective, the other sort has acted equally. The response of the normal kidney to caffeine is slower than to the other diuretics used. The response of the nephritic kidney to all three diuretics is slower than that of the normal kidney, and the response to caffeine remains slower than to Ringer's or salt solution. The urine produced by the kidney in the early stages of uranium nephritis is smaller in amount and contains less chloride than normal. Caffeine urine in normal animals contains less chlorine than that produced by the injection of Ringer's or salt solution; in nephritic animals all three urines contain less chloride than normal, and caffeine urine still contains less than the other two. In the course of the response to any one diuretic the concentration of chloride in the normal urine increases as the rate of secretion decreases; in the nephritic urine there may be a very slight increase in concentration, or the concentration may fall as the rate of secretion becomes less. Uranium causes glycosuria; the method of experiment also causes glycosuria in normal rabbits. This has to be taken into account in considering the variations in the concentration of chloride.

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(6) Jour. Path. and Bact., April, 1913.

ELECTROTHERAPY.

Electric Treatment of Intermittent Limping. W. Kuhn[7] calls attention to the benefit attained in the case of a man of 68 suffering from intermittent claudication and given treatment with the four-cell electric bath. Each leg was placed in a deep vessel of water at 35° C. and the faradic current was brought into the water. The femoral pulse at first was imperceptible, but after twelve sittings it became palpable again. A point near the tibia remained painful, but this was cured by direct application of the faradic electrode. The patient had long been unable to walk, but now, six years later, he can take comparatively long walks without disturbance.

Ionic Medication in Herpes Zoster Ophthalmicus. The drug used by A. Macnab[8] has been sulphate of quinin, applied by means of the positive current over the whole area affected, for from 15 to 30 minutes, with a current of 1.2 milliamperes to the square inch of surface. In general, two applications at an interval of from 7 to 10 days were made to the skin area, and the conjunctiva was treated separately for a shorter time and with less current. The results were that the neuralgic pains and the disturbed sensibility of the part cleared up almost at once. The iritis disappeared and the sensation of the cornea and conjunctiva returned. As there is in every case some destruction of tissue, Macnab points out that a complete return to the normal can not be expected, but so far as such appeared possible this form of treatment seems to provide a cure for this distressing affection.

Efficiency of High-Frequency Current in Tumors of the Bladder. J. Dellinger Barney[9] reports a case in which a tumor of the bladder was burned with the high-frequency current on four successive weeks, and again five times at intervals of two weeks. At the last sitting, the tumor consisted of a few small nodules, but for the first time a number of little papules were to be seen clustered around the parent growth on the bladder wall.

(7) Zentralbl. f. Chir., April 26, 1913.
(8) Lancet, March 22, 1913.
(9) Boston Med. and Surg. Jour., July 3, 1913.

The diagnosis of infiltration by a malignant growth was made, and operation performed. The entire thickness of the bladder was removed for a distance of half an inch outside the limits of the site of the tumor. Microscopic examination of this piece of tissue failed to reveal any evidence of tumor cells. Nine months later, the bladder was normal, except for a somewhat puckered scar and a moderate cystitis. So far as Barney knows, this is the first case in which a bladder tumor treated and presumably cured by the high-frequency current has been actually inspected at a subsequent time either at operation or post mortem.

EMETINE.

Treatment of Amebic Dysentery by Emetine. G. Baermann and H. Heinemann[1] conclude that emetine is an exceedingly powerful amebotropic, amebozitic remedy, which, by subcutaneous or especially by intravenous administration, appears to destroy amebæ contained in the intestinal walls, and in suppurating surfaces, as abscess walls. Amebæ specially protected by location are spared. Total amebic destruction, so far as can now be observed, is only accomplished in very exceptional cases. Isolated single amebæ usually appear again in from ten to seventy days; but in three patients there suddenly appeared evidences of numerous young amebæ. In another, instead of the negative form, there appeared many cysts. The cysts are not affected by emetine. As a result of repeated emetine injections, abscesses which would otherwise prove fatal heal rapidly. As the best mode of administration the authors advise one or two intravenous injections, with 100 c.c. physiologic salt solution, or, combined with these, subcutaneous injections of from 150 to 200 mgm. within eight or ten days, at from two to three day intervals, according to the state of the patient. Later, from four to five subcutaneous injections of 100 to 120 mgm. should be given. These after-treatments should be intermittently repeated in periods of from three to four weeks. Careful observation of the stools is absolutely

(1) Münch. med. Wochenschr., June 3, 1913.

necessary, and must be extended over a period of months. The maximum dose is 250 mgm. for sixty kilo. of body weight.

Tablets of Emetine in Amebic Dysentery. It may be remembered that in 1858, Surgeon E. S. Docker, then stationed in Mauritius, first advocated the use of large doses of ipecacuanha in dysentery, and succeeded in reducing the dysentery death-rate in the island from 10—18 per cent. to 2 per cent. The more recent investigations of Major Leonard Rogers[2] are fresh in every one's mind, and have demonstrated that the salts of emetine are specific in amebic forms of dysentery, and that, moreover, they can be given with safety without the serious nausea and vomiting characteristic of ipecacuanha. In one case, an amount of emetine corresponding in four weeks to 1000 grains of ipecacuanha was well borne.

That ipecacuanha should have been so suddenly and so dramatically rehabilitated is one of the surprises of science when we recall that not very many years ago its use on active service was seriously banned by a committee of experts sitting in London. The investigations of Vedder, an American officer stationed in the Philippines, formed a fresh starting-point. Vedder found that fluid extract of ipecacuanha inhibited the growth of dysenteric amebæ *in vitro*—later furnishing the observation that broth cultures of dysenteric amebæ were destroyed by emetine. On these facts Rogers seized, with keen perception of the practical clinical application of the discovery. "I therefore," he says, "tested the effects of the solutions of emetine on *A. histolytica* in dysenteric stools." All the force of Rogers's investigations lies in these last three words. He found, in point of fact, that amebæ in dysenteric stools were killed by a dilution of 1 in 10,000 of emetine hydrochloride, and rendered inactive even by so high a dilution as 1 in 100,000. Microscopic examination of the dysenteric ulcers in an advanced case which ended fatally failed to reveal a single living ameba, after a dosage of 3½ grains in 2½ days.

(2) Indian Med. Gaz., February, 1913.

The keratin-coated product of emetine constitutes yet another advance, and has been introduced in order to enable the hydrochloride to be given by mouth. The keratin coating facilitates the contents of the product reaching the pathogenic areas of the bowel, unimpaired in activity and without interfering with gastric processes. Tablet emetine hydrochloride, gr. ½, keratin-coated, is especially suitable for routine treatment in dispensary and out-patient work, since it enables the patient to take the remedy himself.

Emetine in Amebic Dysentery. Rogers[3] reports his results by this method.

One of Dr. Rogers's tables shows 26 consecutive cases treated in the same ward by his new plan of administering soluble salts of emetine hypodermically, or in a few of them by the mouth. They are classified in the same way as those in another table so as to be readily comparable. The first two patients were admitted in a hopeless condition and died in less than three days, gangrene of the cecum being found in the first case post mortem, although an extraordinary improvement in the stools had taken place within 48 hours and no amebæ could be found remaining in the bowel after death, having apparently all been killed by the 3½ grs. of emetine hydrochloride he had received during life. In the next two patients the dysenteric symptoms cleared up completely within two days under emetine, but one European female died of heat stroke some days after being convalescent of the dysentery, and the other, a very anemic and dropsical subject, developed cancrum oris and died two days after the dysentery was cured.

These two cases, then, are both remarkable examples of the rapid cure of dysentery by emetine in subjects who were so debilitated as to succumb shortly to other diseases, and can not fairly be treated as failures of the emetine treatment. All the remaining 22 patients have recovered—a remarkable testimony to the value of the new treatment, as they included a number of very severe and advanced cases, while no less than four showed a very high degree of leukocytosis, which has already

(3) Indian Med. Gaz., November, 1912.

been pointed out as being of most fatal import under the old methods of treatment. The only failures, therefore, have been in the two patients who were moribund on admission, while no case has been discharged "otherwise" at his own request while still uncured. As the emetine series also includes a fair number of chronic cases with dysentery of from one month to one year's duration, they are good samples of all types and stages of amebic colitis.

If we take the cases in which a cure was effected as judged by the final disappearance of blood and mucus from the stool, we find that the duration of the treatment with ipecacuanha varied between 5 and 44 days, and averaged 11.4 days, during which periods from 140 to 1320 grains of the drug were taken, the average quantity being 406 grains. On the other hand, with the emetine treatment the stools finally became healthy in from 1 to 4 days, the average time being 2.3 days, while the quantity of emetine taken up to that time averaged 2 grains, and the total amount given while the patient remained in hospital averaged 5.03 grains. The stay in hospital of the ipecacuanha patients varied from 7 to 60 days, the average being 16.4 days, while under emetine it lasted from 5 to 11 days and averaged 7.2 days, which included one day during which they were kept under observation before the specific treatment was begun, unless the condition was an urgent one. It is preferable to keep the patients in longer, but when the dysenteric symptoms regularly disappear completely in from 2 to 4 days and solid diet then begun causes no relapse, it is difficult to persuade them to stay. Rogers asserts that he has had a number return to see him after an interval, and so far no true relapse of amebic disease has come to his notice.

One patient of the above series did return and die of dysentery, but after death the upper part of the large bowel showed extensive scars of healed amebic ulcers, while the lower half revealed an acute bacillary dysentery from which Shiga bacilli were cultivated. In a second similar case in another ward pneumonia was found post mortem, together with paralytic dilatation

of the cecum and ascending colon, due to the extensive destruction of the muscular as well as the mucous coats, but only scars and no recent ulcers were present. Yet this man had only received 3 grains of emetine 5 weeks before his death, and he also had a small encysted liver abscess, free from both bacteria and amebæ, and evidently beginning to dry up. These two cases of apparent relapse only proved that the former amebic disease had been completely eradicated, and indicate that about three grains of emetine had really completely sterilized all the tissues of the body so far as the ameba is concerned. If further experience confirms these results the emetine salts will constitute the most remarkable therapeutic remedy yet discovered.

The occasional failure of hypodermic injections of emetine salts in the case of very acute sloughing amebic dysentery dying within less than 3 days of admission led Rogers to consider the possibility of giving the salt intravenously. In a recent very severe case with great thickening of the cecum and local peritonitis, he gave a dose of ½ gr. of the hydrochloride dissolved in 5 c.c. of normal saline injected very slowly into an arm; he watched the pulse carefully, and found that the injection did not depress it in the least. In the evening he gave ⅔ gr. in the same way, and on the following day 1 gr., in addition to subcutaneous injections, and at the time of writing the local symptoms had much improved, the passage of sloughs had ceased, while the amebæ disappeared from the stools within 24 hours of the first injection, and there is fair hope of the man's recovery. Whatever the ultimate result may be, it is at least clear that full doses of the drug may safely be injected intravenously, which is clearly the best plan in desperate cases. There was no sickness or nausea after the two large intravenous doses, but bilious vomiting both before and after the first one.

Diagnosis and Emetine Cure of Amebic Colitis. Rogers[4] gives these directions for the examination of the feces for the *Amœba dysenterica:*

In a large majority of amebic dysentery cases the

(4) Lancet, Oct. 19, 1912.

pathogenic organism is easily and quickly found on examining a drop of the blood-stained mucus thinly spread out under a cover-glass with an ordinary high power, such as a 1/6-inch lens. Thus, out of 50 consecutive cases of which he has notes, in 42 per cent. the amebæ were noted as being "very numerous," which means that they were present in nearly every field of the microscope and were found immediately; in 48 per cent. they were "numerous"—that is, they were found by a search of two or three minutes' duration; in 4 per cent. they were "few" and found after a longer search, and in an equal number they were "very few," and only detected by the special procedure to be described. In one case they were not seen during three examinations of the stools, although a subsequent post mortem examination revealed the presence of very chronic amebic ulcerative colitis. In four of the above cases the parasites were not found at the first examination, but were numerous in three cases at a second attempt, usually on the following day, and few in the remaining one. It thus appears that in 90 per cent. of the cases the organisms are very readily found after one, or occasionally two examinations, the procedure being far easier and quicker than the hunt for malarial parasites.

Much has been written on the differences between the harmless *Amœba coli,* with its lack of clear ectoplasm, well-defined nucleus, and small size, and the pathogenic *Amœba histolytica,* with the opposite characters and frequent inclusion of red corpuscles in its substance. In Rogers's experience in examinations of dysenteric stools the former is so rarely encountered that from the practical point of view it may be safely neglected, and he agrees with Craig in thinking that whenever amebæ are found in diarrheal or dysenteric stools they may safely be regarded as pathogenic and their hosts treated accordingly. That this is a safe practical rule will be clear, from the simple fact that among 33 consecutive cases of dysentery under his treatment subsequently to his commencing the emetine treatment, in 24 amebæ were found, and in all of these, except two nearly moribund cases, the dysenteric symptoms completely cleared

up within from 2 to 4 days; while on the other hand in none of the remaining non-amebic cases did the drug have any material effect on the progress of the disease, although it never appeared to do any harm. The effect of the new treatment, therefore, furnishes a very reliable clinical differentiation between the two types of dysentery, which is by no means the least of its advantages.

A rapid method of detecting amebæ when present in scanty numbers: Although as a rule it is very easy to find the amebæ owing to their numbers, in the exceptional cases in which they are very few the following technique will be of great assistance: French writers in particular have advised the addition of a drop of 1 per cent. watery methylene blue to a piece of dysenteric mucus, as it stains the pus and epithelial cells at once, while for a time the amebæ resist taking up the stain and also retain their activity. They thus stand out clearly amid their blue surroundings as light refractile motile bodies, and are readily detected even if comparatively few are present. Recently Rogers has found that with a little practice it is possible to detect them in such a preparation examined directly after it is made with a very low power, such as Zeiss A or a half-inch lens, a higher power being turned on to verify the find. With some practice they may also be seen with the same low power in unstained mucus as small glistening particles, the condenser being fully lowered for this method of examination, and any find being further scrutinized by a 1/6-inch lens. By these means a fair-sized piece of mucus thinly spread under a full-sized cover-glass can be completely searched within a very few minutes, while a second piece should be examined before a negative result is recorded, and if necessary the examination repeated on the following day.

It is also important to note that full doses of ipecacuanha or emetine should not be given before the stools are microscopically examined, or a negative result is likely to be obtained in amebic cases, just as in malaria after quinine has been taken. The stools should also be examined as fresh as possible, preferably within an

hour or so of being passed. In lower Bengal no artificial warmth is necessary, but in colder places the specimen may be kept at blood heat for a short time and the slide warmed. The organisms should always be seen in active motion before a positive diagnosis is made, for there are often large mucoid cells present, especially in bacillary dysentery, which may easily be mistaken for inactive amebæ by the inexperienced. Staining with the iron-hematoxylin method will enable amebæ as well as their young budding forms to be recognized, but is seldom necessary. Small oval flagellated trichomonds are often seen in addition to amebæ, and also disappear under ipecacuanha or emetine.

Rogers makes a comparison of the ipecacuanha and emetine treatments. He had already recorded some striking cases illustrating the curative action of emetine salts in amebic dysentery and hepatitis. In the latter condition half-grain doses of the hydrochloride hypodermically once or twice a day very rapidly relieve the acute pain and tenderness and stop the fever, while if suppuration has not yet occurred the leucocytosis also soon disappears and the patient is convalescent. If the increase of the white corpuscles continues there is probably a collection of pus in the liver. This should now be removed by aspiration and one grain of the soluble emetine salt, dissolved in about one ounce of water, injected into the cavity before the cannula is withdrawn and the puncture sealed with collodion. Subcutaneous emetine injections should be continued for several days to kill any amebæ remaining in the wall of the abscess or of the large bowel, and if there is no secondary bacterial infection of the abscess, and it is still confined to the liver substance, it will nearly always dry up without further trouble, incision and drainage being usually unnecessary. If the cavity is a very large one the aspiration may have to be repeated, as in an old debilitated patient from whose liver Lieutenant-Colonel A. H. Nott, I. M. S., recently removed 80 and 45 ounces of pus by aspiration at ten days' intervals, and who recovered perfectly under the emetine treatment just mentioned. There is

good reason to hope that the open operation will in the future be only exceptionally required in the treatment of amebic liver abscess, greatly to the comfort of the patient.

In order to allow the precise value of the emetine treatment of amebic dysentery to be estimated we now require a consecutive series of unselected cases, which can be compared with a similar series treated by the recognized ipecacuanha method. Such data are now available regarding 54 cases under Rogers's care in the isolation ward of the Calcutta Medical College Hospital, and the most important facts concerning them are briefly summarized in the following table, which includes 30 consecutive cases treated with ipecacuanha, and 24 in which emetine was used:

A Comparison of the Ipecacuanha and Emetine Treatments.

	Ipecacuanha.	Emetine.
Died from dysentery within 3 days of admission.	4 cases	2 cases
Died from dysentery over 3 days after admission.	7 cases	.....
Died from other disease after cure of dysentery...	.....	2 cases
Removed from hospital in very bad condition....	2 cases	.....
Left hospital unchanged or not cured.....	4 cases	.....
Cured	13 cases	20 cases
Average days in hospital of cured cases.....	16.4	7.2
Average days before stools became normal.....	11.4	2.35
Average grains of ipecacuanha or emetine to that time	406.	2.0

Many of the patients in both series were admitted in a very bad condition, a considerable proportion being chronic attacks of from one month to over one year's duration. The patients who died within less than 3 days of admission are shown separately in the first line of the table, as they came under observation in a practically hopeless condition, so that it will be fairest to omit them in calculating the failures of either form of treatment. On the other hand, the two shown as removed from the hospital by friends in a very bad condition should be included in deaths, as there was little or no chance of their recovery. This would leave 9 deaths out of 26 cases, or a mortality of 34.6 per cent. in the ipecacuanha series, against no deaths due to dysentery among the non-moribund cases treated by emetine—a highly satisfactory result. Of the 2 patients entered as dying from other diseases after cure of the

dysentery by emetine, one succumbed to heat stroke several days after, being quite free from bowel trouble, and the other, a dropsical and very anemic subject, developed cancrum oris, which proved fatal 10 days after the dysenteric symptoms had finally developed, both conditions being indirectly due to the extreme feebleness of the patients after 2 and 7 months' dysentery respectively. It is also noteworthy that none of the emetine patients left the hospital uncured, although 6 of the surviving 19 of the ipecacuanha series declined to continue the treatment and had to be discharged. Once more, the average duration of the ipecacuanha treatment up to the time the blood and mucus finally disappeared from the stools in the recovering patients was 11.4 days, and their total stay in hospital 16.4 days; while under emetine salts the corresponding figures were 7.2 and 2.35 respectively. Lastly, the average amount of ipecacuanha taken before the stools became normal was 406 grains, and further considerable amounts were administered to most of them before their discharge from hospital. On the other hand, the average amount of emetine required for the cure was 2 grains, being equivalent to 180 grains of ipecacuanha, some of the patients receiving further small doses, so that the new method is also an economical one, especcially if the time in hospital is taken into account.

As to the methods of administration and dosage of emetine salts, Rogers asserts that he now always uses the hydrochloride of emetine, as it is much more soluble than the hydrobromide, the latter requiring about 2 c.c. of water to dissolve a full dose, and is then liable to become deposited as crystals in the capsules, but is readily redissolved by gentle heat. The hydrochloride can now be obtained from the leading manufacturing chemists either in tablets, suitable for hypodermic use, or already dissolved and sealed in glass ampoules. In adults he now seldom gives less than half-grain doses, and prefers ⅔ grain, equal to 60 grains of ipecacuanha, twice a day for the first two days in severe cases, and then once for another day or two, which is usually sufficient for a cure. Solid food is begun in the form of

soft rice and other farinaceous foods on the fourth day, and Indian patients can seldom be induced to stay in the hospital over a week unless very debilitated on their arrival.

As the hypodermic method is not always convenient in practice in India, he has tried ⅓ grain tablet by mouth on an empty stomach, and finds that ⅔ grain can generally be taken without producing any material sickness and with much more favorable results than with ipecacuanha by the mouth, although the action is slower and less effective than by the hypodermic method, and in one patient blood and mucus reappeared in the stools after three days' absence, although he had taken a total of 2 grains by the mouth; but all symptoms finally vanished after 2 more days on hypodermic doses. In children of about 7 years of age he found that ⅓ grain doses of emetine subcutaneously are well borne and rapidly effective, even in very chronic cases, while in severe cases in adults he has frequently given 1 grain at a dose and repeated it in about twelve hours, and has not yet seen any toxic effects.

Does the emetine treatment produce a complete and permanent cure? Rogers has already recorded two cases in which death took place from multiple abscesses of the liver and gangrene of the cecum respectively, very shortly after emetine treatment has removed the dysenteric symptoms, in both of which microscopic examinations showed a complete disappearance of the amebæ from the bowel and liver tissues, although they had been abundant in the stools on admission. The important question remains as to whether a few of the parasites may not survive and subsequently bring about a relapse, just as in malaria, trypanosomiasis, and syphilis respectively, after quinine, atoxyl, and salvarsan treatment. In order to solve this problem Rogers has been endeavoring to follow up his patients after they leave the hospital, and has either seen or heard from several of them some weeks after their discharge.

Emetine in Dysentery in the United States. W. Allen,[5] of Charlotte, N. C., publishes his experience in

(5) Jour. Amer. Med. Ass'n., March 1, 1913.

two cases of amebic dysentery with the emetine treatment, the value of which has been demonstrated in the tropics. His method was the same as followed there, the injection of emetine hydrochloride beginning with small doses but rapidly increasing to one or two grains or even more. The remedy seems to be absorbed by the blood and not to cause nausea or vomiting, and to succeed when the oral administration of ipecac fails to give relief.

Emetine in Dysenteric Abscess of the Liver. At the meeting of the Société Médicale des Hôpitaux, March 15, 1913, Chauffard[6] reported another case, confirming his previous communications and proving the remarkable influence of emetine on amebic dysentery and its complications.

The case was one of abscesses of the liver which had been opened and which rapidly healed following the introduction of three doses, of 4 cgm. each, of emetine injected under the skin, and of 8 cgm. inserted in the cavity. The patient was a man of 40, who was attacked by dysentery in July, 1912, and who had suffered from several acute attacks of amebic hepatitis. He entered the hospital exhibiting the symptoms of abscess of the liver. He was operated on by Labey, who drained out a sterile, chocolate-colored pus, finding the amebæ in the walls of the abscess. After the emetine treatment, the discharge of the pus from the wound rapidly ceased, and eleven days later the liver was completely cured.

At the same meeting, Rouget cited the case of a patient who had suffered from abscess in a torpid form, without fever, since 1905. Every year the patient suffered from painful attacks, that were referred to the liver. The diagnosis was doubtful for a long time, but recently, by radioscopy and by exploratory puncture, it was shown to be a case of amebic abscess. Rouget, some days later, made a lumbar puncture, withdrawing 200 c.c. of pus, and introduced under the skin 8 cgm. of emetine. The improvement was marked and the patient now appears cured.

Chauffard declared that the toxicity of emetine is,

(6) Gaz. des Hôp., March 18, 1913.

experimentally, very slight, and that in the doses employed, which seem sufficient to bring about a cure in man, the toxicity is *nil.*

Emetine in Tuberculous Hemoptysis. Flandin and Joltrain[7] reported to the Societé Médicale des Hôpitaux, that they had conceived the idea of employing emetine in the hemotypsis of tuberculosis, for a long time treated by the classical authors with ipecac. Chauffard, Dopter, Rouget, and Dufour have observed, under the emetine treatment, the bloody appearance of the pus disappear in abscess of the kidney and dysenteric stools.

Without wishing to draw definite conclusions from a single fact, Flandin and Joltrain report their experience in the case of a man suffering profuse tuberculous hemorrhage from the lung, associated with high fever, which did not yield to the ordinary methods of treatment, such as ice and calcium chloride. A single injection of 4 cgm. of emetine hydrochloride caused the temperature to fall from 40° C. (104° F.) to 37.2° C. (98.9° F.), the hemoptysis was arrested abruptly and did not reappear.

EUCALYPTUS OIL.

Inunction with Eucalyptus Oil in Measles. D. J. Connolly[8] has given the inunction treatment a thorough trial in extensive institutional work and is satisfied that the good results as regards mortality, etc., are well marked. The same treatment has a good record in scarlet fever as well. As soon as the child is received into the measles ward a hot bath is given. Then follows thorough application of eucalyptus oil to the whole of the body, with the exception of the hands and the part of the face round the nose, mouth and eyes. The mouth is irrigated twice daily with weak alum lotion, and glycerine and borax are applied to the interior of the mouth and to the gums. The throat (tonsils and fauces) is treated with carbolic acid (1 in 10) morning and evening by swabbing, a tongue depressor being used. Every day for the following four days the child is blanket-bathed

(7) Gaz. des Hôp., April 17, 1913.
(8) Practitioner, November, 1912.

morning and evening, and again rubbed all over with eucalyptus oil, the throat and mouth having the same treatment as on admission. By attacking the mouth and throat one strikes at one of the chief strongholds of the virus. The main idea as regards the eucalyptus is to get the vapor inhaled into the air passages, though it is probably effective for other reasons besides. The face area is omitted because the vapor irritates the eyes. The children treated by Connolly came from the poorest classes of the community, with poor resisting power, and many were received late in the disease. Often they were already suffering from broncho-pneumonia. The percentage of complications was large, because of the proneness to all kinds of infection of this class of patients. Nursing was careful and constant and the temperature of the wards maintained at about 65 F.

A decided value must be placed on this method of treating measles. Connolly's case mortality fell from 11 to 5 per cent. (two periods of twelve months each being compared). The general measures were the same in both series. The good results are probably attributable to the combined effects of the mouth treatment and the eucalyptus inunctions. Connolly suggests that in time of epidemic all susceptible children be given the benefit of preventive treatment by this method.

Eucalyptus in Pulmonary Tuberculosis. L. G. Pedigo[9] has obtained good clinical results in pulmonary tuberculosis, as well as in ordinary colds, by the inunction of a teaspoonful of a 25 per cent. eucalyptus ointment. The premises of the treatment are: Oil of eucalyptus is known to be inimical to bacterial and parasitic life; in whatever way this agent enters the circulation it will be eliminated chiefly through the lungs, the habitat of the tubercle bacillus in pulmonary tuberculosis. Essential oils, like the oil of eucalyptus, are irritating to the mucous membrane of the stomach; hence the oil can not be administered in this way. Given hypodermically, it is a local irritant. It is very volatile, but to give it by vaporization the patient needs to be subjected to an exhausting vapor bath. It can, however, be intro-

(9) Indian Med. Record, May, 1913.

duced into the circulation readily by incorporating it with an oily base and rubbing it into the skin. It is desirable to have a mixture that will remain firm at ordinary temperatures, but will melt rapidly at the temperature of the skin surface, and to have the base one that will readily penetrate the skin. One that he recommends for the colder months is as follows:

Olive oil	℥ij
Benzoinated lard	℥vj
Cocoa butter	℥iv

Cocoanut oil also makes a good base for summer use.

FORMALDEHYDE.

Formaldehyde Against Flies. In using formaldehyde to kill flies, Houston[1] found the method of exposing it in shallow plates to be useless. An excellent way is to sprinkle the mixture of formaldehyde, milk and water in tiny pools of from ¼ inch to about 1 inch in diameter on the floors, shelves, etc., when the flies readily drink it. He used this method during the last rainy season in a jail kitchen with great success.

The Dangers of Formaldehyde. W. E. Morgan[2] protests against the widespread use of formaldehyde in antiseptic solutions, fumigation and the denaturing of alcohol, on the ground that it produces a severe chemical dermatitis in an unusually large number of people who have an idiosyncrasy toward it. He has suffered for ten months from an extremely severe dermatitis as the result of washing his hands and arms in alcohol denatured with formaldehyde, and finds that the mere presence of the vapor in a room where formaldehyde has been used as a fumigant will bring on a fresh attack. He finds that many other physicians are equally susceptible. For treatment he makes the following recommendations: Use only soaps made of vegetable oils and avoid ointments or emmollients containing animal fats. Apply to the affected parts two or three times daily an ointment made up of zinc oxide, 1 part, starch 2 parts, and petrolatum 8 parts. During the

(1) Indian Med. Gaz., February, 1913.
(2) Jour. Amer. Med. Ass'n, Feb. 22, 1913.

vesicular and acute stage this should be applied without friction; but after the epithelium becomes dry and the derma somewhat thickened and scaly, the ointment can be rubbed in and the zinc reduced somewhat. He avoids all powders except sterilized starch, and uses that during the vesicular stage only. Rubber gloves can not be worn for more than from three to five minutes without producing marked irritation by reason of the confined perspiration. He advises wearing a cotton protecting sleeve or glove, or both, night and day until the parts are thoroughly healed.

GELSEMIUM.

Gelsemium in Pellagra. R. Blosser[4] was led to use gelsemium in endeavoring to relieve a pellagrous patient who complained constantly of severe pain in the feet. The dose used was 3 or 4 drops of the fluid extract given every four hours. All other agents were discontinued, and the pain in the feet soon ceased, the strength increased; the appetite returned and the weight increased forty pounds, the patient apparently regaining a normal state of health. Much improvement was noted in four other cases. If drooping of the eyelids or diplopia occurs, the drug is withheld and no further unpleasant effects are observed.

GOLD.

Lange's Colloidal Gold Chloride Test of the Cerebrospinal Fluid in Congenital Syphilis. C. G. Grulee and A. M. Moody[5] have experimented in 25 cases; 10 of clinically congenital syphilis, 7 of suspected congenital syphilis, and 8 non-syphilitic cases. They conclude that while from such a small series of cases one can not show that the gold chloride test gives specific reactions in cases of congenital syphilis, one is justified in saying that the reaction shown in the authors' cases was very suggestive and might prove to be of much more value in the diagnosis of congenital syphilis than any laboratory reactions heretofore presented. They lay stress

(4) Atlanta Journal-Rec. of Med., November, 1912.
(5) Jour. Amer. Med. Ass'n., July 5, 1913.

on the point that, in common with all laboratory tests, the gold chloride reaction must always be regarded only as an aid to clinical diagnosis, and direct that a case showing clinical signs of congenital syphilis should be confirmed by the reaction of the cerebrospinal fluid to the colloidal gold solution of Lange. Although it is possible that treatment will distinctly modify this reaction, it will be to a less degree than with the Wassermann reaction.

Gold and Tuberculin in Lupus. For the treatment of lupus Bettman[6] begins with intravenous injections of gold and potassium cyanide in doses of 0.01 gm. dissolved in at least 50 c.c. of water and rapidly increases the dose to 0.03 gm. every second day. The infusions were painless and local complications except superficial hemorrhage, which never suppurated, were not observed. General symptoms, such as chill, fever, vomiting or diarrhea did not occur and the urine always remained free from albumin. Up to the present 16 patients with lupus have been treated with a series of 14 or 15 gold infusions, the total amount of gold injected being about 0.4 gm. in from 32 to 43 days. As a rule, tuberculin was injected on the days between the gold infusions. The initial dose was always very small (0.00001 gm.) and was increased very slowly and cautiously. With these minimal doses, the constitutional reaction was generally absent and the local reaction very slight when no gold was injected but much more marked with the combined treatment. The author has obtained good results with the combined therapy though it is yet too early to speak of definite cures. It seems that tuberculin is much more potent if used with gold, probably because the latter causes a capillary hyperemia, which allows the toxin to reach the infected foci more readily. The amount of tuberculin injected should always be minimal, so as to avoid severe reaction, particularly when there are also lesions in the internal organs.

Gold Salts in Malignant Tumors. Experimental studies on the effects of various gold salts on the malig-

(6) Münch. med. Wochenschr., April 15, 1913.

nant tumors of animals have been made by C. Lewin.[7] He employed gold and sodium chloride, colloidal gold and gold and potassium cyanide intravenously. The effects of these gold salts were very pronounced in the carcinomata of mice. After as few as two intravenous injections, degenerative changes are very apparent; hemorrhages take place into the tumor and the specific cells become necrotic. After three or four tumor injections, even hard tumors may be converted into cystic structures filled with cell detritus. It seems as if the gold salts have a specific toxic action on the capillaries of the tumor and not on the tumor cells, as has been claimed for other metallic salts. The capillaries of tumors are particularly vulnerable since they are the most recent in the organism and probably have insufficient resisting powers owing to their rapid growth.

HELIOTHERAPY.

Light Treatment of Bone and Joint Tuberculosis. Vulpius'[8] experience seems to have demonstrated that practically as fine results can be obtained with exposures to the arc light or mercury lamp as to the direct sunlight, and at sea level as in the mountains. He reports surprisingly complete cures in numbers of cases, even in cases which had resisted all other treatment for months and years. The pain and swelling subside, the suppuration dries up, and the lesion heals over while the stiff joint regains unhoped for movability. He mentions four sanatoriums in Germany, including his own near Heidelberg, where these principles are being applied in treatment of surgical tuberculosis without the necessity of an expensive trip and long sojourn far from home.

Direct Sunlight in Non-Tuberculous Affections. Aimes[9] enumerates the various affections in which heliotherapy has been found an extremely useful adjuvant, citing various authors. The list includes varicose ulcers, burns, sprains and contusions, certain gynecologic affections, atrophied muscles, resolution of inflammatory

(7) Berlin klin. Wochenschr., March 24, 1913.
(8) Monats. f. Geburt. u. Gynäk., May, 1913.
(9) Presse Méd., Mar. 19, 1913.

exudates, and the sequels of plebitis and conjunctivitis. He states that the mucosa is less sensitive to the sunlight than the skin, and relates that of 48 eyes with trachoma, 35 were cured by exposure to the direct sunlight at two sittings and there has been no recurrence during the long period since. The conjunctiva of the lids bears prolonged exposure to the direct sunlight without harm, according to Borel's experience, but he did not notice any improvement from the exposures in rheumatic iritis, in mycosis, or in syphilitic affections. Aimes reiterates that heliotherapy can be applied everywhere and is within the reach of all, while the results may be remarkable and that no one should neglect this simple and easy method of treatment.

HEXAMETHYLENAMINE.

Albuminuria Under Hexamethylenamine in Typhoid. Triboulet and Levy[1] gave a subcutaneous injection of 0.2 gm. hexamethylenamine in 1 c.c. of water to a child of 6, morning and evening, gradually increasing the doses up to 4.5 or 6 gm. a day. The dosage for older children and adults was proportional to this. They give the details of three cases in children aged 7, 12 and 14 respectively. All seemed to benefit materially by the medication and the only by-effect noted was a slight brief albuminuria due mainly to the presence of Morner's mucoid body, a pseudo-albumin. The microscope revealed only bladder cells or red corpuscles and there were no tube casts, leukocytes or kidney cells. These findings excluded a tendency to nephritis as the cause of the albuminuria. They suggest rather that the albuminuria was really a pseudo-albumin of vesical rather than renal origin. Nothing was observed in any instance resembling the reaction in guinea-pigs reported by Frothingham. The tongue grew moist, the patients felt stronger, the diarrhea seemed to be influenced and the urine cleared. The temperature was normal by the end of the third week, but the pulse remained fast for a few days longer.

(1) Presse Méd., Feb. 22, 1913.

Therapeutics of Hexamethylenamine. H. A. Hare[2] calls attention to the fact that one of the advances made in therapeutics during the last two decades has been the introduction into medicine of one or more substances which, comparatively harmless to the body of the patient, nevertheless inhibit the growth of pathogenic organisms which may have invaded that body. The most important of these, aside from the specific remedy, salvarsan, is without doubt hexamethylenamine. Considerable divergence of opinion has existed as to the manner in which it acts as an antiseptic in the genito-urinary tract. It is commonly believed that the drug is decomposed in the kidneys, or in the urine as soon as it is excreted, and that formaldehyde is set free, which acts as formaldehyde or combines with any sodium which may be present forming a sodium compound.

Hare also calls attention to the most recent investigation on this subject by Jordan. The doses that he employed were 10 grains three times a day, either alone or in conjunction with acid sodium phosphate or potassium citrate. He found that when pathogenic organisms are present the disinfectant or germicidal influence of hexamethylenamine amounts to little or nothing if the urine is alkaline or faintly acid, but becomes very powerful if the urine is rendered distinctly acid by simultaneous administration of acid sodium phosphate. Conversely, that the simultaneous use of potassium citrate, whereby the urine is made alkaline, diminishes the antiseptic power of hexamethylenamine. It would seem probable, however, that this rule does not apply to those cases in which the colon bacillus is the cause of the genito-urinary infection. Indeed, it is possible that the remedy does best in this infection because an alkaline urine is less favorable to the growth of the colon bacillus than is the urine with an acid reaction. Hare points out that it has been known to practical therapeutists for many years that hexamethylenamine does best in cases of vesical irritation and inflammation, not dependent upon distinct infection,

(2) Prog. Med., December, 1912.

when the urine is alkaline and loaded with phosphates, since it tends to make the urine acid; and conversely, it may increase irritability if the urine is excessively acid. The conclusion to be drawn, he states, would seem to be that it is important in the treatment of these cases, first, to determine whether the trouble is dependent upon the presence of an infecting organism, then to determine the reaction of the urine, and if it be alkaline, to administer acid sodium phosphate, or perchance potassium bitartrate, to increase the urinary acidity if ordinary pathogenic germs are present.

Vanderhoof recommends hexamethylenamine as a remedy of great value in cases of acute colds, and in patients suffering from acute and chronic bronchitis. The drug should be given in large doses, accompanied by the copious drinking of water. In the ordinary cold, treatment with hexamethylenamine shortens the stage of coryza and greatly modifies or entirely prevents the succeeding bronchitis. He also believes that it acts as a prophylactic against ensuing infection of the accessory nasal sinuses. Vanderhoof says that it is our best remedy in acute bronchitis. Certain cases of chronic bronchitis respond to treatment by hexamethylenamine with a gratifying alacrity, while others do not. In the latter instance it is presumed that structural changes have occurred in the walls of the bronchi, associated with thickening and calcifications of the cartilages, fibrous membrane and muscular coats so as to preclude the hope of successful treatment by any remedy.

Hexamethylenamine in Surgery. A. C. Burnham[3] looks on this substance as one of the best examples of a product of true chemico-therapeutics, acting as a poison to the infecting organism, as quinine and salvarsan act in malaria and syphilis; that is, it injures the infecting organisms more than it does the body tissues. However administered, it appears, after a short interval, usually less than hour, in the urine and in various other secretions, imparting in each case an antiseptic property to the secretions. Of itself, it has only a very slight

(3) Med. Rec., July 5, 1913.

antiseptic action, but when added to acid urine, formaldehyde is liberated and the urine becomes antiseptic. Experiment, however, justifies us in the assertion that this substance has an antiseptic action also in alkaline and neutral body fluids when kept at body temperatures, and that this action is greater in those cases in which stasis allows time for the liberation of formaldehyde to take place. Two important uses are attached to hexamethylenamine; first, as a prophylactic against infection; and, secondly, as a curative agent when infection is already present; the former is an important one, but it is difficult of proof and is too often overlooked. It has been most frequently used in infective conditions of the genito-urinary tract, but it has been shown to be of value in septic and purulent types of meningitis and in the prevention and treatment of otitis media and mastoiditis. The dose varies with the object to be attained, from 20 to 40 grains daily suffice in bladder diseases, while in gall-bladder infection, or purulent meningitis, from 200 to 300 grains daily may be required in grave cases. The remedy should always be given well diluted (2 grains to the ounce or diluent), and is best administered by mouth, but may, if necessary, be given by rectum or subcutaneously. The three cardinal points are: Give early; give in sufficient doses; always give in sufficient dilution.

HYDROGEN PEROXIDE.

Hydrogen Peroxide in Carcinoma of Esophagus. S. Fradiss[4] confirms the observations of Liebermeister who showed by *x*-ray and pathologic studies that absolute stenosis, anatomically speaking, is never present in cancer of the esophagus or cardia. There is almost always a channel permitting the passage of fluids, no matter what the degree of stenosis. Complete obstruction of this channel only occurs when it is occluded by food material not sufficiently divided before swallowing and by the products of decomposition of the necrotic tumor-mass. In these cases 1 dessert spoonful of from 1 to 3 per cent. hydrogen peroxide solution is given every

(4) Monthly Cycl. of Pract. Med., February, 1913.

hour. In less than twenty-four hours the stenosis is overcome and in a few days the patients, who previously have been unable to swallow anything, can eat purees and even solid food. The distressing subjective symptoms simultaneously disappear. The patients may even gain in weight and recuperate so much as to present a normal appearance. One of Liebermeister's patients gained 18 pounds. The author refers to a case in which 12 pounds were gained in four weeks. The patient then left the hospital, still taking the peroxide; but later he neglected its use for several weeks, with the result that he was obliged to return. Upon resumption of the treatment for two weeks, 13 pounds were gained. The same cycle of events was then repeated, the beneficial effect of the measure being thereby clearly shown. In scirrhous cancers the peroxide produces little or no effect, but in the other types it constitutes one of the best palliative measures now available.

Hydrogen Peroxide in Gonorrhea. Although injections of hydrogen peroxide were advocated by Lowe in the treatment of gonorrhea some years ago, the method does not appear to have received general recognition. According to Skoulsky,[5] however, most satisfactory results are obtained by the urethral injections, and he ascribes their success to the power of diffusion as well as the bactericidal properties of hydrogen peroxide. They are at the same time much less irritating to the mucous membrane than the silver preparations usually employed. Several cases of acute and chronic gonorrhea are reported in detail in which the treatment was successfully employed. In one case the patient had suffered from chronic posterior urethritis for three months, and the usual injections of silver nitrate, permanganate of potash, etc., had failed to cure. The author commenced with injections of 20 c.c. of hydrogen peroxide, diluted to half strength, twice a day, the fluid being retained for three minutes. The amount was gradually increased to 50 c.c., and at the same time the strength was gradually increased till the hydrogen peroxide was injected undiluted. At the end of two weeks the pa-

(5) Hospital, Aug. 13, 1910.

tient was cured, and bacteriologic examination of the urine was negative and remained so. Another case is recorded in which a chronic posterior urethritis of three years' duration, under similar treatment for two weeks also resulted in a cure, with complete disappearance of the gonococci in the urine. In acute cases the author does not advise the injections till the second or third week.

HYPEREMIA.

Present Status of Hyperemia Treatment. The poultice, the hot sand bag and similar long-tried measures owe their efficacy, says Joseph,[6] to the hyperemia which they induce, and the benefit is proportional to the way in which they conform to the principles which Bier has found the secret of success in his methods of passive and acute hyperemia. The hyperemia has a curative influence only when it is the local concentration of healthy blood; hence measures to improve the state of the blood as a whole may be included in the term "hyperemia treatment." Joseph discusses the technic for the various methods of inducing hyperemia, reiterating that the limb to which the constricting band is applied to induce local hyperemia must always feel as warm, if not warmer, than its mate. If the limb grows cold this is a sign that the blood is being shut off from the limb instead of collecting in it, and thus the opposite of the desired effect is realized. With small, peripheral infectious processes it is sometimes better to apply a second constricting band close to the lesion, in addition to the one higher up on the limb, as the hyperemia induced by the latter grows less and less toward the periphery so that the lesion may escape its effect unless re-enforced by a second, looser, constricting band closer to it. The earlier the hyperemia treatment is begun the better the outcome. In constitutional diseases the blood as a whole is so poor that little can be hoped from it; with nephritis it is liable to increase the tendency to dropsy. Mild diabetes is not a contra-indication, but diabetic furuncles and carbuncles require great caution. The

(6) Therap. der Gegenw., June, 1913.

suction cap should be large enough to rest everywhere on sound tissue. Here, as in all cases, the suction must never be strong enough to aspirate the blood. Arteriosclerosis as a rule need not be regarded as a contra-indication, but nervous diseases, tabes, alcoholism, etc., render the application of hyperemia treatment extremely difficult as the disturbances in sensation deprive us of this useful guide. When the blood has been injured beyond repair by sepsis, hyperemia is hopeless, but a sudden transient invasion of the blood and comparatively benign pyemic metastases are amenable to this form of treatment. Pyemic joint affections are the banner field for it, Joseph declares. He regards the appetite and ability to sleep as the only means at our disposal to differentiate between the hopeless and the favorable types of sepsis. The fever may be alike in both forms. The finding of streptococci or staphylococci in the freshly voided urine suggests metastatic pus foci in the kidney, but even then the hyperemia technic may be applied for a brief trial. If the proper reaction, namely, warm edema, does not follow, the attempt had better be abandoned at once, as also in progressive necrosis. Hyperemia treatment requires skill and patience and it should not be attempted for insignificant lesions which heal without it. But it far surpasses all other methods, he insists, in treatment of recent joint affections of gonorrheal origin and for all recent, severe, infected or suspicious injuries and wounds. No physician skilled in the technic would be willing to do without it now in treatment of tendon sheath phlegmons, mastitis, furuncles on the face, and carbuncles, etc. Tuberculous lesions may require that it be kept up for years to be finally successful, and consequently it is foolish to commence it with persons who are unable to devote the necessary time to it. For tuberculous joint lesions the constricting band should be applied for two hours a day, drawn just tight enough to induce considerable edema, with possibly a slight livid aspect of the limb. No pain should ever be caused by the constriction; the prompt relief of existing pain is one of the great advantages of the method. Tuberculous abscesses should be punctured

and the contents aspirated with a vacuum cup, suction hyperemia being maintained in this way, with intermissions, up to a total of thirty minutes a day, until the abscess has entirely healed over; the constricting band for passive hyperemia can be continued at the same time for two hours a day. The method is best adapted for the hand, foot and elbow; the shoulder is less favorable for it and it can not be applied to the hip joint at all. Lesions in the testicles and epididymis are also amenable to this treatment. In conclusion, Joseph endorses Bier's recent statements in regard to the great advantage of giving internally from 1 to 8 gm. of sodium iodide daily to supplement the local hyperemia. This wards off development of cold abscesses.

IODINE AND ITS COMPOUNDS.

Organic Iodine Preparations. Up to the present time, it has not been shown, according to F. C. McLean,[7] that the organic iodine preparations, with the exception of preparations of thyroid, have any specific action in pathologic conditions, except the action of iodine after separation from the molecule. The iodized proteins seem to be of advantage for therapeutic use only in so far as they avoid gastric irritation. The more stable compounds are apparently not well utilized, while the less stable compounds have no advantages over the alkaline iodides, either as to local effects or rapidity of absorption and excretion.

The iodized fats and fatty acids seem to have some advantages when the continuous action of small amounts of iodine is desired. They are more slowly and evenly split and the amount of available iodine in the blood does not vary from time to time to the extent that it does when the alkaline iodides are administered. The use of the iodized fats in such conditions as arteriosclerosis, bronchial asthma, lead poisoning, etc., probably has some rational basis, therefore, on physiologic grounds. These substances are also, as a rule, non-irritant to the stomach. The difference in frequency of iodism is probably due to the difference in the amount

(7) Arch. Int. Med., November, 1912.

of available iodine present in the body at any one time. When large amounts of iodine are desired, as in cerebrospinal syphilis, avoiding the danger of iodism would be at the sacrifice of therapeutic efficiency.

The use of organic iodine preparations with toxic side actions, due to the molecule or the products of its splitting, should be discouraged. The products of iodine with the higher fats and fatty acids, however, are generally free from toxic actions.

Application of Iodine to the External and Internal Generative Organs of Women. Bovee[8] notes that the greatest and most frequent disadvantage of the iodine method is associated with the dermatitis that follows the application of the drug. It arises mainly from two causes: the use of a tincture of great concentration, and the application of large quantities and collection in the creases and recesses of the skin. As a result of bacteriologic experiments, Bovee believes that the proper strength is 3.50 per cent. of crystals dissolved in 95 per cent. alcohol. He holds that the remedy may be profitably applied in the following class of conditions:

Acute infections of the vulva, vagina, urethra, and the whole of the endometrium.

Acute peritoneal infections with proper limitations.

Chronic conditions following infections of these structures and of the tubes, ovaries, and pelvic peritoneum.

In pelvic surgery requiring examinations, manipulations or operations on or through the vagina.

In such procedures as require opening the cervical canal or uterine cavity from either the vaginal or peritoneal side.

As a routine method of preparation of the field of operation on all these structures as well as the rectum.

He has great confidence in the efficacy of the treatment when applied early in gonococcus infections. If the condition be treated before the infection has passed into the uterine cavity or the glands of Bartholin, it can often be eradicated by one thorough painting of the exposed areas below the uterine cavity. If the first ap-

(8) Amer. Jour. Obst. and Dis. of Women and Child., February, 1913.

plication fails a second made three days later commonly succeeds.

If the vulvovaginal or Skene's glands are involved he makes the same vigorous onslaught, and if the corporeal endometrium be involved the uterus is injected under slight pressure, the patient being anesthetized for the purpose. Should the infection be due to some other agent the same identical treatment is employed. When one has first treated acute and subacute localized peritonitis thus he is not prepared to find the notable freedom from gaseous distention and from localized pain and the comfort manifested by the patients continuously from the time of operation.

In chronic conditions arising from infections of any portion of the female genital tract he freely applies the iodine and aims always to have it reach the pelvic peritoneum through the uterus and tubes whenever these structures are involved. It is a uniform procedure in subacute and chronic pyosalpinx to inject the uterus and tubes as well as possible with iodine before opening the abdomen. If the appendages are matted down and degenerated from a former infection the remedy is similarly applied.

In pelvic surgery that requires examinations, manipulations, or operations on or through the vagina this plan of local sterilization is far superior to any other used. The iodine requires a maximum of two minutes to prepare the field. He places the anesthetized patient on the operating table and has several students examine her, after which the iodine is applied and the field thus quickly prepared. If complete hysterectomy is required from above the preliminary sterilization of the vagina is of distinct value.

The importance of this vaginal application of iodine is emphasized in radical operation for cancer of the cervix uteri. The high mortality from infection of the peritoneum as a result of breaking of the specimen during its removal and resulting leakage is a striking feature of the recent report of Wertheim's work in this field. This sad complication is best obviated by the use of the iodine to both the vagina and endometrium, pre-

ceded by galvano-cauterization with or without curettement, if excrescences or craters be present.

The iodine is applied to the skin surfaces of the vulva and the vagina. After the insertion of the Sims speculum and a proper exposure of the vaginal walls and cervix, enough iodine is injected to coat over the area covered by the speculum, as soon as the instrument is withdrawn. Exposure of the cervix may be made by either the Sims speculum or some other retractor, and it is grasped by a vulsellum and held firmly for the injection. A glass 2-ounce syringe having a conical end about two inches in length is loaded with the iodine preparation. It is inserted into the uterine cavity and the fluid is slowly injected with or without pressure as one selects. If pressure is employed the syringe is held in place for a period of time, sometimes as much as two minutes. If the peritoneum is to be reached considerable force and perhaps one or two minutes' time as well as all the solution will be required. If only the uterus is to be treated and the tubes avoided, half the solution given with slight pressure quickly stopped will be sufficient. Moreover, if the nozzle be not pressed to the hilt in the external os uteri, a return flow will be provided, which lessens the probability of tubal invasion.

Tincture of Iodine in Fresh Wounds. For eighteen months, while on the house staff of the New York Hospital, Orr[9] has used the U. S. P. tincture of iodine in treatment of fresh wounds, in the dispensary, on the ambulance and in the hospital. During this time he has treated nearly 1,000 patients with incised, lacerated and contused wounds, dog-bite, compound fractures, traumatic amputations, etc., with excellent results. He describes the method as follows: The more simple the technic the better. If the area about the wound needs shaving it should be shaved dry. Any loose tags of tissue or skin or foreign body should be removed with sterile instruments and not washed out. No water or watery solution should touch the wound. The tincture of iodine is first painted about the wound and allowed to dry for a short time, giving opportunity for penetration. Then

(9) Missouri State Med. Ass'n. Jour., May, 1913.

with another bit of sterile cotton on a toothpick the wound itself is painted thoroughly. Dannreuther's method of injecting the deeper recesses of a wound with a medicine dropper is a good one but should not be depended on entirely in cases of puncture wound where there is a liability of tetanus infection. A sterile compress is then held firmly over the wound, if it is small, until hemorrhage is stopped, and a sufficient number of sutures applied to approximate the edges of the wound when indicated. In the large lacerated wounds the iodine may be poured into the wound after painting a free area about it. Drainage should, of course, be used when indicated, especially in the badly contused lacerated wounds where there is apt to be much oozing and the resistance of the tissues is much below *par*.

The Use of Iodine for the Eyes. Jacqueau[1] finds that tincture of iodine is as valuable an antiseptic in ophthalmology as in genuine surgery. There is no risk involved as the tissues of the eyes bear it perfectly. One or two drops of cocaine should be instilled beforehand to avoid pain, and the iodine applied directly to the seat of injury by meanes of a cotton pledget. It is particularly valuable in affections of the lids, in corneal ulcers and for pre-operative and post-operative work on the eyeball. Many cases of injuries which are ordinarily sent to the specialist could be successfully treated by the general practitioner by the application of tincture of iodine. He has thus used it in thirty-seven cataract operations among others.

Hot Air and Nascent Iodine in Aural and Nasal Conditions. E. J. Brown[2] states that patients complaining of sore throat and earache from acute pharyngitis have been relieved by a single application of hot air and nascent iodine and have reported the following day that there has been no return of their discomfort. Altogether there is so much advantage and so little of unpleasantness to the patient or inconvenience to the doctor that these conservative methods of treatment ought to commend themselves to the careful physician. The

(1) Lyon Méd., Apr. 27, 1913.
(2) Jour. Amer. Med. Ass'n., June 21, 1913.

results of these hot-air and nascent iodine treatments seem to be specifically the destruction of the less resistant bacteria and the drying and shrinking of the tissues with a secondary increase of cellular activity and removal of inflammatory products which interfere with drainage. The nascent iodine is generated in a simple apparatus by the heating of iodoform.

Iodine in Thyroid Carcinoma. Experimental observations on the effects of administration of iodine in thyroid carcinoma are reported by Marine and Johnson.[3]

The principal data of Case 1 are: Patient was under observation 168 days—23 days before and 145 days after operative removal of part of the thyroid tumor. Metastases were without doubt present before the patient came under observation. The thyroid contained several adenomas of the fetal type and while it is impossible to state from what portion of the thyroid the carcinoma originated, Marine and Johnson have come to the conclusion from the tumor pattern that it probably originated from an adenoma. The whole course of the disease was, so far as could be determined, one of uncomplicated thyroid cancer. Seventeen cubic centimeters of syrup of ferrous iodide were given before operation and 12 gm. of sodium iodide, and 198 c.c. of the syrup of ferrous iodide were given after operation—iodide having been continuously administered from Nov. 14, 1911, to April 15, 1912, with the exception of 18 days from Dec. 20, 1911.

Patient 2 was in the hospital until death—235 days. She was admitted for and had active pulmonary tuberculosis. Thyroid carcinoma was not definitely recognized until December 3, when, owing to tracheal stenosis, a palliative operation was advised. The tuberculosis doubtless hastened death. The tumor though metastasizing was of slower growth than that in Case 1. The carcinoma and the tuberculosis were joint factors and the individual importance of each can not be estimated. In this case also there was one typical adenoma in the right lobe and the general type of tumor led the authors to look on this carcinoma as also originating in an

(3) Arch. of Int. Med., March, 1913.

adenoma. No iodine was given prior to the operation. Following the operation iodine was given continuously until April 25, 1912—eight days before death—with the exception of 52 days following Jan. 5, 1912. She received a total of 13 gm. of sodium iodide and 119 c.c. of syrup of ferrous iodide.

In Case 3, a dog was under observation for approximately seven months. Carcinoma was suspected after the fifth month. Small doses of Lugol's solution were administered by mouth with slight interruptions from October until May 8. The total amount of iodine used could not be obtained. In these three cases, therefore, it seems that cancer tissue exhibits practically no capacity for iodine retention, contrasted with the non-tumor thyroid, which has a marked capacity for storing iodine; and with benign epithelial tumors (adenomas), all of which in some phase of their existence have some capacity for iodine, thyroid cancer exhibits the least—in these three cases probably no capacity for iodine.

Iodipin in Prostatitis. Prostatitis is a common and disagreeable complication of gonorrhea which may delay the cure for many weeks. The methods commonly employed for treating this condition are prostatic massage, hot rectal irrigations and the insertion of suppositories containing ichthyol and potassium iodide. Massage frequently does more harm than good, particularly if practiced before the third week; suppositories not rarely give rise to tenesmus. The patient may also find it difficult if not impossible to resort to the irrigations. L. Fischel[4] states that he has obtained a good therapeutic effect from iodipin applied in the form of a rectal injection, both in recent and in old cases in which considerable infiltrations were found in the gland. As a rule 10 c.c. of a mixture of one part of iodipin 25 per cent. and two parts olive oil are injected into the rectum every day or, in mild cases, every second day. An improvement will be noticed within a week; the gland diminishes in size and the second portion of urine begins to clear. As a rule the prostatitis is cured in from two to three weeks or else small nodules remain which can

(4) Münch. Med. Wochenschr., March 25, 1913.

easily be dissipated by massage or hot irrigations. According to this author very few cases resist this treatment.

LACTIC ACID.

Lactic Acid in Psoriasis. J. M. Winfield,[5] of Brooklyn, says that while the parasitic theory of psoriasis has much in its support the belief that this disease is the expression of some disturbance in metabolism seems to be nearer to the solution of the problem. Acting on this supposition he has for years been treating his patients with lactic acid and colonic irrigation, assuming that intestinal auto-intoxication is an etiologic factor of the disease. Lactic acid disinfects the alimentary canal by its bactericidal action; colonic irrigation washes out decomposing matters, stimulates peristalsis, improves the intestinal circulation, relieves passive inflammatory conditions, and increases the skin resistance by improving general health. Analysis of his cases, 40 in number, is given. In 23 cases the attack was cured and in 16 there was improvement; 30 of the cases had only lactic acid and irrigations, in the other 10 chrysarobin ointment was also used. The general results were far better, in his experience, than when the other well-known measures were employed. Two of the cases are briefly reported.

LITHIUM.

Lithium Poisoning. A case of poisoning by lithium in his own person after taking a total of 125 grains in 28 hours is reported by S. A. Cleveland.[6] In the first experiment 2 gm. were taken in a glass of water after each meal for three meals and then, after skipping one meal, another 2 gm. dose was taken. Slight dizziness and fullness in the head were felt three or four hours after the second dose, which was taken in the evening. Soon after the third dose there was much blurring of the vision and dizziness, and after the fourth dose, taken at night, dizziness became so marked that the room seemed to go around at night and sleep was impossible.

(5) Jour. Amer. Med. Ass'n., Aug. 10, 1912.
(6) Jour. Amer. Med. Ass'n., March 8, 1913.

"The next morning the condition approached prostration. The eye symptoms were exaggerated and the dizziness, weakness and tremors were so intense that there was staggering and it was necessary to go to bed. The eye and ear symptoms lasted about a day and a half after the last dose. The weakness and tremors persisted for five days. At no time were there any gastro-intestinal symptoms—there was no abdominal pain, diarrhea or gastric irritation, and the whole appetite was very good throughout the whole time." Several months later the experiment was repeated to make sure that the effects were due to lithium. Only two 3 gm. doses were needed to bring on the dizziness and blurring of the vision. The general symptoms were less marked than before, but there was some weakness for a day or two. Again there were no gastro-intestinal symptoms, which, according to the literature of lithium poisoning as quoted by Good, are characteristic. The striking cinchonism effects observed in these experiments do not appear to have been noticed by previous reporters. The two or three times larger doses, however, used by Cleveland are mentioned in this connection, and apparently as possibly acounting for these effects.

LOBELIA.

Uses of Lobelia. W. W. Cox[7] has a very high opinion of the therapeutic value of lobelia as a means of slowing the pulse and reducing temperature, which it does without ever reducing these below normal. In average doses, it acts as a very quick emetic, especially if combined with such stimulants as capsicum and ginger; while, if given in a little hot water and on an empty stomach, lobelia seldom produces emesis. Beginning with 5 drop doses of the fluidextract or tincture (U. S. P.), or even, sometimes, much larger doses, repeating every fifteen or thirty minutes, and gradually increasing the dose, say to 30 drops, the entire system can be brought thoroughly under its influence without emesis. Furthermore, given in minute doses of 1 or 2 drops of the tincture or fluidextract in a little hot

(7) Amer. Jour. of Clin. Med.

water, it acts as a satisfactory sedative in irritable stomachs, often allaying vomiting when other agents fail.

MAGNESIUM SULPHATE.

Local Use of Epsom Salts. Many physicians are claiming good results from epsom salts used locally. Thus, E. H. Leaman[8] says that in an inflamed joint of a rheumatic nature the use of a hot saturated solution of magnesium sulphate is an excellent remedy. It should be applied with a goodly supply of gauze and the heat maintained by dry towels and further prolonged by hot-water bottles. In mild cases such treatment continued for twenty-four hours is all that is required.

In contusions of the large muscles of the limbs in which the skin is broken and in which the use of lead water and laudanum or a phenol solution is dangerous, the above solution of magnesium sulphate acts very well.

In painful conditions of the feet in which only the muscles are involved, the same solution applied for thirty minutes in the same manner as a hot foot bath gives marked relief.

Local Anesthetic Action of Magnesium Sulphate. This question was studied experimentally by B. Wiki.[9] The method used was that previously employed by Moukhtar for other purposes, *viz.*, injection of a solution of the local anesthetic agent to be tested into the skin adjoining the spinal column in guinea-pigs. The presence of any degre of local anesthesia is shown by the diminution or lack of response of the skin muscles when the overlying cutaneous area is touched—normally a very easily elicited reflex in these animals.

It was found that, while magnesium sulphate solutions of from 3 to 5 per cent. strength generally produce only an hypo-esthesia, those of from 7 to 12 per cent. strength induce a well-marked anesthesia, rarely exceeding eight minutes in duration. Solutions of from

(8) Medical World.
(9) Arch. internat. de pharmacodyn. et de therap., vol. xxi, Nos. 5-6, 1912.

15 to 25 per cent. cause a complete local anesthesia lasting about one-half hour, after which local sensibility very gradually returns. A saturated solution containing 0.62 gm. of the salt in each cubic centimeter produces complete anesthesia the duration of which generally exceeds one hour.

In order to prove that the effects witnessed were not dependent on the osmotic tension of the solutions used, comparative tests were made with solutions of magnesium sulphate, sodium sulphate, and sodium chloride, shown to be isotonic by cryoscopy. It was found that, whereas solutions of the last two salts approximately isotonic with the body fluids have no anesthetic power, magnesium sulphate solutions of the same molecular contraction (about 7 per cent.) produce a distinct local anesthesia. With stronger solutions, the freezing-point of which is below —2°, sodium sulphate and chloride do induce anesthesia, but this is always of much shorter duration, and usually less complete, than that caused by magnesium sulphate. A solution of magnesium chloride of 5 per cent. strength was found to produce an anesthesia of short duration; from 7 to 10 per cent. solutions produce insensibility lasting somewhat over half an hour.

Intradural Injections of Magnesium Sulphate in Tetanus. Theodor Kocher[1] states that he has successfully employed a modification of Meltzer's method in the treatment of tetanus. A carter, aged 56, was seen on November 29. A fortnight previously, during stable work, he cut his left thumb; the wound was cleansed and sutured on the following morning. Eight days after the accident the wound suppurated, and the sutures were removed. On November 27, trismus appeared. This was followed by lumbar pain and rigidity, which spread to the shoulders, arms and legs. On admission to the hospital there were marked opisthotonos, dysphagia, and profuse sweating. The temperature and pulse were normal. The wound was cleansed and painted with iodine. Ten cubic centimeters of tetanus antitoxin were injected hypodermically near the wound, and to-

(1) Schweizer Aerzte, Sept. 10, 1912.

ward night a similar amount was injected intravenously. Two hypodermic injections of 2 per cent. carbolic acid (Baccelli's method) were also given. But, in spite of treatment, the tonic spasms increased, and the face became cyanosed. On November 30, at noon, 2 c.c. of a 25 per cent. solution of magnesium sulphate was injected into the lumbar subarachnoid space. The muscular rigidity soon decreased. In the evening a second subarachnoid injection of magnesium sulphate and a third injection of 10 c.c. of tetanus antitoxin were administered; 500 c.c. of sterilized water were injected subcutaneously. On December 1, the rigidity was less, but spontaneous micturition was impossible. An intradural injection of 3 c.c. of a 25 per cent. magnesium sulphate solution, and also hypodermic injections of morphine and carbolic acid, were given. On December 2, micturation was normal. Injections of carbolic acid and chloral were given. On December 4, the rigidity again became marked, and 5 c.c. of the magnesium sulphate solution were again injected. Fifteen minutes later, the rigidity decreased, first in the legs then, in order, in the abdomen and arms. An hour later, the patient could sit up, and soon the muscles were fully relaxed. Later in the day some rigidity recurred. On December 5, on the increase of rigidity, 5 c.c. of the magnesium solution were injected. The rigidity decreased within half an hour. The treatment was repeated with the same good result on December 6 and 7. On December 8, four doses of 15 grains of calcium chloride were given. On December 14, the muscular rigidity had almost disappeared, but there was again retention of urine with suppression of the patellar reflexes. The patient was discharged cured on the thirtieth day after admission to the hospital.

In two further cases of tetanus with severe attacks of tonic spasm and opisthotonos, which occurred as often as twenty times in fifteen minutes, intradural injections of magnesium sulphate were equally successful in combating the muscular spasms; recovery followed in both cases. In the first of these cases after the seventh injection of 5 c.c. of the magnesium sulphate solution un-

consciousness supervened and respiration ceased. Tracheotomy was performed, a cannula was introduced nearly as far as the bifurcation of the trachea, and oxygen was insufflated. Sufficient space existed between the walls of the cannula and trachea for the exit of the gas or air. The cyanosis subsided, but the respirations remained at two or three in the minute during an hour. Consciousness was recovered twenty-four hours later. Tetanus antitoxin was also employed.

This method of treatment is based on the researches of Meltzer and Auer, who found that magnesium sulphate and chloride when injected subcutaneously in the proportion of 1.5 grammes per kilo of body weight produce deep sleep with muscular relaxation and abolition of all reflexes except the conjunctival and trigeminal. Doses exceeding 2 grammes per kilo are followed by arrest of respiration, the heart continuing to beat for a time and the blood-pressure being maintained. Hence resuscitation is possible by artificial respiration, providing O'Dwyer's apparatus for intralaryngeal insufflation under pressure is used. Local applications of 25 per cent. magnesium sulphate solution to nerve trunks produce complete nerve block, both conductivity and excitability being suppressed. Sensory nerves are more rapidly affected than motor.

Mathews and Brooks conclude that magnesium salts, like curare, paralyze the motor nerve endings before the respiratory center. However this may be, physostigmine, which is physiologically antagonistic to curare, is also antagonistic to magnesium, and invariably stimulates the respiratory center. If respiratory paralysis is threatened, the danger may be rapidly removed by Arnd's method of washing out the lumbar sac with sterile normal saline solution; the only disadvantage is temporary paralysis of the bladder. The position of the patient at the time of and after the injection is of great importance. The action of the magnesium is at first local. Hence, if the body is raised almost vertically and the neck is flexed, the evil effects on the respiratory center may be avoided. But if the upper part of the body is involved, and especially in cephalic tetanus, it

is desirable to extend the action of the salt to the medulla oblongata. For this purpose the legs may be raised above the body for a time. Kocher believes the strength of the solution recommended by Meltzer to be unnecessarily strong; 15 per cent. proved ample. Of this solution as much as 10 c.c. may be safely injected. Two injections may be given daily, though, owing to a cumulative action, not at too short intervals. Thus two doses of respectively 7 and 10 c.c. were given within five hours. Deep sleep, from which the patient could not be awakened, and stertorous breathing resulted. If the urgency of the symptoms rapidly necessitates a second dose, the amount injected should be reduced by half.

Injections of Magnesium Sulphate in Tetanus. A number of cases of successful treatment of tetanus have been reported. Patterson[2] reports having used subcutaneous injections of 10 c.c. of a 10 per cent. sterile solution of magnesium sulphate. In two days great improvement was noticed, but this was followed by relapse. The injections were given every four hours, but as the spasms became more severe the quantity of the solution was doubled and the intervals between the spasms gradually became prolonged. When treatment was stopped an erythematous rash appeared over the whole body. The relaxation of the muscles was a gradual process interrupted by a series of long-drawn-out, painless, and ill-defined waves of tonic contractions.

Goepp and Eshner, of Philadelphia, have reported a case of successful treatment with antitoxin and intraspinal injections of magnesium sulphate. Bromides and chloral were given the first five days, and heart stimulants when demanded. On admission the wound was excised and dressed antiseptically, and an intraspinal injection of 2 c.c. of a 25 per cent. solution of magnesium sulphate was administered. Twelve injections were given during the fourteen days. The largest amount of cerebrospinal fluid obtained was four ounces on the eleventh day.

Tetanus antitoxin was administered on the second day and continued simultaneously with the injection of

(2) Lancet, April 2, 1910.

the magnesium sulphate. Three of the injections of antitoxin were intravenous and eight subcutaneous. The first three doses were of 5000 units, the remaining nine of 3000 units. The injections were followed by spasms, and on several occasions by priapism, after which the patient usually fell into a profound sleep. The convalescence was prompt and uneventful.

Willetts, of Pittsburgh, has reported three cases of acute tetanus treated with subarachnoid injections of a 25 per cent. solution of magnesium sulphate, with recovery in each instance. He says: "I believe magnesium sulphate by subarachnoid injections offers great assistance in the treatment of tetanus, and if carefully used will save many lives by quieting the muscle spasms and resting the patient until his protective forces can overcome the toxin of the disease. Any one who has seen the remarkable change from a condition of general rigidity and convulsions to the relaxation and quiet sleep following the injections can not doubt its value in these cases.

"One of the important advantages gained by the treatment is the opportunity of nourishing the patient during the period of relaxation."

Magnesium Sulphate in Eclampsia. Guggisberg[3] was disappointed with the outcome in the two cases of eclampsia in which he applied Meltzer's intraspinal magnesium sulphate treatment. When the action of the drug is restricted to the lower portion of the spinal cord, the therapeutic action is inadequate. But when the drug is sent to the upper part of the spinal cord—by raising the lower part of the body—the drug effectually reduces the tendency to convulsions, but the method ceases then to be harmless. Disturbances in breathing may be anticipated. The method should not be attempted outside of an institution where medical supervision is possible all the time. The magnesium sulphate acts only on the convulsions; the injury of the parenchymatous organs from the eclampsia is not affected by this drug.

(3) Zentralb. f. Gynäk., March 15, 1913.

MANGANESE.

Manganese Poisoning. L. Casamajor,[4] of New York, describes a syndrome observed by him among some workers in a separating mill connected with a large mine from which zinc is the principal product. Eighty-five different ores are found in this mine. One ore, a sesqui-oxide of zinc, iron and manganese, comprises 54 per cent. of the ore body. Willemite, a silicious oxide of zinc, forms 21 per cent.; rodenite, silicate of manganese, forms 9 per cent., and the red oxide of zinc 4 per cent. The remaining 81 ores make up the other 21 per cent. in varying quantities. Arsenic is absent and only very minute amounts of lead are present. In the separation of the crude ores the magnetic ones are removed by very powerful electro-magnets in a dry state, and further separation is done by a specific gravity method under water. The dust question is an important one, and, in spite of all the efforts to eliminate it and regulate the washing and changing of the clothes of the men, there is still a great deal in the air. Nine cases of poisoning have been observed and form the material of this paper. Lead and arsenic may be absolutely excluded as causative agents. The symptoms are practically the same in all cases. They are principally marked festination, with sometimes stiffness and pain of the legs and intention tremor. About half the patients have defective hearing not due to middle-ear disease. Asynergia is present in all the well-marked cases. There is never any rest tremor of the limbs. Sensibility is preserved as well as muscular power. The blood never shows the changes characteristic of lead poisoning. The speech in some of the patients is somewhat slurring. The urine and spinal fluid examinations were negative in cases where made, as was also the Wassermann reaction in five of the patients. The face has somewhat the mask-like character seen in paralysis agitans. There are no characteristic mental symptoms, though one patient showed defective intelligence, which has improved. One patient died of pneumonia; autopsy showed no

(4) Jour. Amer. Med. Ass'n., March 1, 1913.

characteristic gross changes except large perivascular spaces in some of the basal ganglia of the brain. No patients have recovered. Casamajor does not think that zinc can be held responsible, and the cases resemble most those reported by Embden in workers in a manganese dioxide grinding-mill. He sums up his paper with the following conclusions: "1. This is a definite pathologic condition, recognizable by a definite symptom-complex. 2. It is a pathologic condition of the central nervous system affecting principally the mechanism of walking and equilibrium. 3. It can not be placed under the heading of any known central nervous system disease. 4. It is of toxic origin, and in greatest probability the toxic agent is manganese."

MERCURY.

The Lethal Dose of Corrosive Sublimate. Almost always when a physician is called to testify in a court of law in a case of poisoning he is asked by one of the attorneys, or by the judge: "what is the lethal or fatal dose of the poison under consideration?" and not infrequently the legal mind finds it difficult to understand why the physician can not name a definite or fixed amount of a well-known toxic agent.

There are, of course, many reasons for this aside from the difference in susceptibility of the individual. Much depends on the rapidity with which the absorption of the drug has taken place, and this in turn depends on the activity of the circulation, the competency of the stomach to perform its functions, and whether the poison is diluted by considerable quantities of food and drink. For this reason all those who are acquainted with toxico-logical literature know that the lethal dose of death-dealing drugs must vary in each individual case, in some instances an amount scarcely larger than that sometimes employed for medicinal purposes acting as a poison, and in other instances very large doses being taken without the production of very dangerous symptoms.

An illustration of this fact is afforded by a report made by Fuller,[5] who records the case of a man of 85 years, who swallowed by mistake 8¾ grains of bichloride of mercury. The patient at once recognized his error and drank a tumblerful of barley water. Seen by his physician half an hour later, he was given white of egg, and when he retched he brought up blue-stained mucus from the indigo in the bichloride tablet. The stomach tube was then passed and the stomach washed out with large quantities of albumen-water and milk and water. There was an urgent desire for the bowels to move, but very little more than mucus was passed. The patient became extremely collapsed, was cold and pallid, and the pulse was almost imperceptible. Strychnine was given hypodermically and milk and brandy by the mouth. The next morning he was somewhat better, but was still in a very critical condition, and for several days the bowels continued to be very irritable, but his general condition improved. After a slow convalescence he quite recovered from the effects of the poison. Fuller points out that while other cases have been recorded in which recovery has followed an even larger dose, nevertheless an instance is reported in the *British Medical Journal* for 1905, Vol. I, in which a dose of 2½ grains was swallowed and death ensued in three weeks from the diarrhea which was induced. The fact that recovery took place in a man of 85 years is also of interest.

A Peculiar Case of Poisoning by Calomel. H. Spindler[6] reports the case of a child 2½ years of age, suffering from a mild attack of grippe, who was given by mistake a 0.3 gm. (5 grain) cachet of calomel instead of a 0 2 gm. (3 grain) cachet of antipyrin. No untoward manifestation was noted, and the mistake made was not realized until five hours later, when, immediately after the child had been given to drink one-quarter of a glassful of Vichy water, she was seized with convulsions, the head being extended, the eyes turned up, and the arms stretched out on the bed, with the fists clenched

(5) Brit. Med. Jour., Jan. 18, 1913.
(6) Presse Méd., April 26, 1913.

and executing clonic movements. The spasms ceased after four or five minutes, and the breathing, previously jerky, simultaneously stopped. The face became violet, foam appeared on the lips, the head sank to the side, and the extremities became limp. The pulse could not be felt. Sylvester's method of artificial respiration and rubbing with vinegar resulted in a return of the circulation and respiration within five minutes, but consciousness was not regained and the eyes remained fixed for an hour after.

A large glycerinated enema brought about abundant evacuation of formed yellow feces and a diminution of the abdominal distention previously present. Later, vomiting of glairy material took place, and two copious evacuations of greenish-yellow, extremely offensive material occurred. On the succeeding two days, fever, slight cough, and evanescent disseminated râles were noted. The treatment consisted of antipyrin and quinine, with tincture of iodine and cotton wrapping, externally, and later syrup of cinchona. Rapid recovery followed.

This child had never had convulsions before; nor did she have any in the two years after the calomel and Vichy adventure. The disturbance seems to have been caused through an immediate reaction taking place between the sodium alkali in the Vichy water and the calomel, the latter having been taken five hours before and become more or less altered during its sojourn in the digestive tract.

Intramuscular Injections of Mercury (Emulsion) in Syphilis of the Nervous System. L. L. Cazenavette[7] states emphatically that mercury has been, and is still, our best weapon against the ravages of the spirochete, and of value in all stages of syphilis. While admitting that remarkable results have been obtained by a single dose of salvarsan, it is not only necessary to repeat the injection of salvarsan two or three times at intervals of a few weeks, but to follow this by mercurial treatment, in order that the spirochete may be destroyed and

(7) New Orleans Med. and Surg. Jour., May, 1913.

the disease cured. The advent of salvarsan, according to this writer, has helped to strengthen the belief in the therapeutic possibilities of mercury. In the treatment of syphilis of the nervous system rapid mercurialization is necessary to arrest promptly the ravages of the disease. His favorite method is the intramuscular injection method, as this has several advantages: the treatment is entirely in the hands of the physician; the amount of mercury administered is small; salivation is infrequent and the amount absorbed into the system is definite; finally, there is no disturbance of the alimentary canal. He favors the use of the biniodide in oily solution.

Lichen Planus Treated by Mercurous Iodide. A case of lichen planus in a negress was discussed before the New York Dermatological Society by Howard Fox,[8] of New York. The patient had suffered from two previous attacks, similar to the present one, and which lasted about a year. The present attack began about six months ago. There were, when presented, only a few typical lichen planus lesions on the arms and trunk. The greater portion of the eruption consisted of pigmentation, which was especially profuse over the buttocks and thighs. No lesions were seen in the mouth. Under treatment with mercurous iodide the improvement was rapid and pronounced.

Another case of lichen planus of the oral cavity was discussed before the Chicago Dermatological Society by Foerster, of Chicago. The lesions of lichen planus on both legs had existed for the past four years, and had suddenly increased in number two months ago. Examination of the mucous membranes at that time revealed typical lesions of lichen planus, which had not been noticed by the patient, almost covering the lips, buccal mucous membrane and tongue. The remainder of the body had never been affected. Under mercurous iodide the lesions rapidly involuted and when the patient was exhibited had almost disappeared.

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(8) Jour. Cut. Dis., August, 1910.

NITROGLYCERINE.

When and How to Use Nitroglycerine. Edward E. Cornwall[9] emphasizes several points in connection with these questions. The general indications for the use of this remedy are to relieve symptoms of localized arteriosclerosis or arterial spasm in vitally important regions of the body, and, when there is pain due to contracted or diseased arteries, in other regions; to reduce general high blood pressure if its continuance threatens accidents to the cardiovascular system; and to clear the diagnosis. The chief contra-indications to its use are either a low or a relatively low blood pressure; advanced chronic nephritis with very high blood pressure and toxemic conditions producing high blood pressure, as a rule; and the presence of an idiosyncrasy in regard to its action. It should never be used primarily as a heart stimulant. When placed under the tongue effects are as prompt as when injected subcutaneously. If given too long or in two large doses it can produce injurious effects, which, however, disappear when the remedy is discontinued.

OPIUM.

Effect of the Opium Alkaloids. E. S. Faust[10] has experimented with opium alkaloids in various combinations and finds that all the active principles are not necessary to produce the typical opium effect. The only indispensable ingredient is morphine. The combination of morphine with the other alkaloids does not reduce but rather enhances the narcotic effect of morphine upon the sensory centers in the cerebrum. The paralytic effect of morphine on the respiratory center can be combated by the synchronous, stimulating effect of other alkaloids, notably by thebaine, which in this respect acts like strychnine. The opposite holds true for the vomiting center, which is stimulated by morphine and depressed by other alkaloids. It seems that narco-

(9) Jour. Amer. Med. Ass'n., July 12, 1913.
(10) Münch. med. Wochenschr., Nov. 12, 1912.

tine, narceine and papaverine, either alone or in combination, have no effect on the tonus of the stomach.

Influence of Opium and Its Derivatives on Motor Functioning of the Intestines. Zehbe[4] reports Roentgenoscopic research on normal individuals given 20 drops of tincture of opium or one of its derivatives 15 minutes before an ordinary meal. The depressing influence of the drug on the motor functioning was most marked for the large intestine and least for the stomach.

Effect of Opium on the Human Intestinal Tract. Mahlo[5] determined by means of *x*-ray pictures the effect of opium on the intestinal tract. Its greatest influence is on the large intestine, retarding the functioning so that food remains in the intestine for from 24 to 33 hours. The effect on the small intestine is also considerable, its action being delayed for from 5 to 8 hours. The action on the stomach is more inconstant. The motility was not markedly decreased except in one case. The peristaltic motion is first stimulated and then depressed. The sphincter of the pylorus is contracted and the muscle tone so depressed that dilatation, particularly of the fundus, takes place. Opium seems to have a more intense effect on the intestine when it is used in conjunction with castor oil.

ORGANOTHERAPY.

Adrenal Preparations.

[There are on the market many preparations of the adrenal gland. Each manufacturer, however, gives his own product a name which he has trademarked; thus we have adrenalin, epinephrin, suprarenin, suprarenalin, etc. For the convenience of the reader all these preparations are here grouped under the general head of "adrenal preparations."—Ed.]

Suprarenal Therapy. J. Aikman[6] summarizes a few important points as follows: Constitutional effects are obtained only by hypodermic injections or intravenous infusions. The hemostatic effect is obtained only by

(4) Therap. Monats., June, 1913.
(5) Deutsches Arch. f. klin. Med.
(6) New York Med. Jour., March 29, 1913.

local applications of the drug. Given by the mouth, suprarenal extract has little or no action aside from the local effects. It should not be used in treatment of pulmonary or cerebral hemorrhages. Failures in the treatment of bronchial asthma are generally due to faulty diagnosis or to improper administration of the drug.

Rationale of Use of Adrenalin in Treatment of Asthma. McCord[7] discusses the reports on this subject. He makes no attempt to cover the entire literature, but rather cites the experimental basis for adrenalin treatment and attempts to correlate clinical results, explained at present by means of far-fetched theories. That adrenalin has found so scant favor at the hands of the general practitioner may be ascribed to the fear of evil secondary effects. Braun warns against the subcutaneous injection of adrenalin, but wide-spread and extensive clinical experience not only does not bear this out, but indicates that such a fear is groundless. Kirchheim injected daily 12 c.c. of the market solution for many weeks into patients with severe infectious diseases. No secondary evil effects were noticed. At the time of injection certain unpleasant results have been pointed out as occurring transiently. Severe palpitation of the heart may occur, leading to a very pronounced, but not accelerated, pulse. A peculiar restlessness may set in, which may alarm the patient, and at times the face may rapidly become very pale; but all these pass rapidly away, and at the same time the respiration becomes easier and softer and the rattling and wheezing sounds cease.

From the results indicated above growing out of the use of adrenalin by both laboratory and clinical workers it seems reasonable to conclude:

1. Adrenalin extends the lumina of contracted bronchioles.

2. This dilatation of the bronchioles is probably the basis for the beneficial action of adrenalin in the treatment of asthma.

(7) Med. Record, March 8, 1913.

3. The dilatation follows subcutaneous, intravenous, and endobronchial administration.

4. The action is transient but very effective in relieving the acute attack. The subcutaneous administration apparently is the most transient.

5. The administration is simple and no injurious results follow as a secondary sequence.

The Antiarthralgic and Antineuralgic Action of Adrenalin. Dr. Felix Gaisbock,[8] of Innsbruck, discusses the antiarthralgic and antineuralgic effects of adrenalin. His observations comprise a series of 15 cases, in 14 of which the onset was acute, and in most of which the use of adrenalin in doses of 5 to 10 drops of the 1 to 1000 solution hypodermically did good.

Four cases of polyarthritis proceeded without complications. Icteric scleræ and increased urobilin secretion were noticed in two cases, with subsequent development of fibrinous pericarditis; and pleural effusion occurred during the course of the disease in two other cases. A striking feature of one case was the appearance of polyarthritis with an unusually marked inflammation of the elbow-joint after lues and its treatment by injection. In another patient, a boy of 16, acute monarthritis formed part of the syndrome of an osteomalacia of the ends of the femur.

Two cases that remained uninfluenced by adrenalin were probably of some other origin (sepsis?). Also unaffected by the medication was a case of arthritis deformans, and one of inflammatory disease of the nerves. Two sciatica patients, aged 53 and 63 respectively, showed decided improvement, especially the younger of the two. The ages of the patients were: 7 below 30 years, 7 below 50 years, 2 above 50 years (the two sciatica cases).

No prolonged unexpected complications were noticed in any of the series. Neither was there any clinical indication of an increased coagulation time of the blood, Velden to the contrary notwithstanding.

In conclusion, it may be said that in adrenalin we have a favorable organotherapeutic agent in inflamma-

(8) Med. Klinik, No. 11, 1913.

tory arthritis, more or less dependent on the etiology of the latter, as well as in neuralgic conditions.

Adrenalin thus takes rank also as an antineuralgic, opening up an entirely new field of indication for the use of the drug, interesting alike to the practitioner and the theorist. Its "asthmatropic" action suggests another similar relationship. Like adrenalin, pyramidon frequently will check promptly a case of bronchial asthma. Their mutual characteristic seems to consist in their influence in correcting local circulatory disturbances (Schmidt); to this also may be attributed the favorable action of adrenalin in osteomalacia, bronchial asthma, and arthritis.

Adrenalin in Whooping Cough. While not claiming to be able to check the paroxysms of whooping cough in ten days by use of adrenalin, Fletcher[9] thinks that his results have been sufficiently gratifying to merit publication.

It was after successfully treating some cases of asthma by the hypodermic injection of 1 in 1000 adrenalin solution that he decided to give it a trial in whooping cough. He did not think it wise to attempt hypodermic medication with children, and so gave it by the mouth. The dose varied from 1 to 3 minims, in water, according to the age of the patient. At first, with infants under 6 months, he gave ½ minim doses, but found that dose too small. The largest dose given was 3 minims, to a patient aged 7 years. The frequency of administration varied according to the severity and frequency of the paroxysms—every three hours in the more severe cases and every four in the less acute.

His first case was that of a boy aged 7 years. Treatment was commenced when the paroxysmal stage had existed for two days. The child was then having attacks of coughing every half-hour during the day, and every twenty minutes during the night. He was given 3 minims every three hours. The paroxysms quickly diminished in frequency and intensity, and ceased completely fourteen days after the treatment was commenced. There was no relapse.

(9) Brit. Med. Jour., Dec. 28, 1912.

Fletcher communicated the results in about forty cases to the Liverpool Medical Institution in May, 1912. Unfortunately, all the cases did not show such a good result as the one mentioned above, but there was decided benefit in practically every one.

The average duration of a case of whooping cough is about six weeks. Under adrenalin treatment it is the exception for one to last longer than three weeks.

In many cases of whooping cough, particularly in infants and young children, there is persistent vomiting, which produces marked anemia and wasting. So far as Fletcher's experience goes, adrenalin checks this quickly, with the result that there is, in many cases, a marked improvement in the patient's general condition before the cough has ceased. This, he thinks, considerably lessens the liability to most of the complications and sequelæ of the disease.

No other form of treatment was administered along with the adrenalin, and the patients were allowed out whenever the weather permitted.

He can not explain the action of the remedy, the administration on his part being quite experimental. The number of cases so treated is certainly not large, and perhaps the results from a more extended trial would not be so successful, but he thinks that adrenalin is worthy of such an extended trial in the treatment of whooping cough.

Adrenalin in Emergency Treatment of Non-Corrosive Poisoning by the Mouth. The hitherto generally recognized antidote in cases of cyanide poisoning, says Jona,[2] has been that advocated by Professor C. J. Martin and Mr. J. A. O'Brien. Its principle is the formation in the gastro-intestine of Prussian blue, which is a practically innocuous substance, by the administration, subsequent to the cyanide poisoning, of ferrous sulphate and alkali. They proposed that 33 c.c. (1 ounce) of ferrous sulphate solution of 23 per cent. strength, 30 c.c. (1 ounce) of potassium hydrate (5 per cent. solution), and 2 grammes (30 grains) of magnesia, the former two kept in hermetically sealed vials, be mixed and imme-

(2) Brit. Med. Jour., Feb. 8, 1913.

diately taken. In their experiments on rabbits, using a lethal dose of 0.01 gramme, given as 10 c.c. of a 0.1 per cent. solution of potassium cyanide per kilogramme of body weight, they found that death invariably ensued unless the antidote were administered within five minutes. Considering that the antidote consists of three separate ingredients, which must be mixed before use, the preparation of the antidote must occupy time and would probably take about two minutes, even if everything were at hand; so that if about three minutes were lost before discovering that cyanide had been accidentally taken, the patient's chances of recovery were very small, for we may legitimately assume that the respite or "latent period" would only be a little if any longer in the human being than in the rabbit. Also, the ordinary medical man might not have the antidote ready at hand, and the value of some means of delaying the absorption of the poison from the gastro-intestine is apparent, and this is especially so in the case of poisoning by cyanide, whose action is so rapid.

Intraperitoneal injections of adrenalin having been found to diminish the rate of absorption of strychnine introduced into the stomach, it was therefore decided to try and see if adrenalin administered by the mouth would have any effect in giving more time to treat a case of cyanide poisoning. As a preliminary investigation, potassium cyanide solution, of strength varying from 1 to 5 per cent., was painted on various mucous membranes (conjuctiva, buccal mucous membrane, gastric mucosa) for five minutes, and then adrenalin (1 to 10,000) painted on, when blanching occurred in every case.

These experiments showed that adrenalin will still exert its vasoconstrictor action even after the arteriolar wall has beeen subjected to cyanide.

Further experiments showed that when adrenalin solution is administered (about 4 to 5 c.c. 1 in 10,000 solution per kilogramme body weight, the rabbit receiving the lethal dose of 0.01 gramme of potassium cyanide per kilogramme body weight) either with or subse-

quently to the administration of the poison, the animal's life is prolonged, and if the adrenalin is administered within five minutes of the poison, and Martin and O'Brien's antidote given, or the stomach washed out within four or five minutes subsequent to the administration of adrenalin, the animal's life will be saved Thus, the administration of adrenalin "on sight" would give a respite of some minutes during which the antidote could easily be prepared and administered or the stomach contents evacuated.

The results of a few of the more crucial experiments are appended. A number of experiments have been discarded because the rabbits did not tolerate the washing out of the stomach to which many were subjected. It may also be stated at the outset that Martin and O'Brien found that if a dose of cyanide is going to prove fatal the rabbit always dies within thirty minutes, so that we may take it that if we are able to tide a patient over the fatal thirty-minute limit by any means at our disposal, then that patient will have a fair chance of recovery. Of course, if it be borne in mind that the adrenalin only delays the absorption of the poison (principally by its vasoconstrictor action on the vessels of the mucosa) it will be recognized (as shown in one experiment) that those cases are practically hopeless in which a large dose of the poison has been taken, and in which the amount of poison being absorbed through the mucosa even under maximal adrenalin influence exceeds the lethal limit, unless the chemical antidote be immediately given or the stomach immediately evacuated. The time relation here indicated (namely, that the pathologic effect depends to a certain degree on the amount of poison coming into contact with the tissues per unit of time), and the fact that the administration of an amount of potassium cyanide below a certain limit is accompanied by very little, if any, evident effect on the animal, seems to suggest that we have in the case of the action of chemical substances on all tissues of the body a parallelism to the action of various strengths of stimuli acting on a motor nerve and effecting the mus-

cular response in the presence of a limen or threshold, an optimum and maximal strength of stimulation. Further research, however, is required to determine this.

Further experiments showed that the administration of doses of adrenalin far in excess of those recommended by the cited experiments left, as far as the eye could detect, no lasting effects on the animals. The general results obtained from rabbits were:

The animal (receiving a lethal dose of 0.01 gramme potassium cyanide per kilogramme body weight) will recover if—

1. Adrenalin (3 c.c. 1 in 10,000 solution) be administered within five minutes of the poison.
2. Martin and O'Brien's antidote be given or the stomach washed out within about four minutes of the administration of the adrenalin.
3. A further small dose of adrenalin be given.

The area of a rabbit's stomach was found to be 95 sq. cm. That of a man is given as about 3000 sq. cm. Therefore, the dose of adrenalin which a man should take on this basis of, say, 3 c.c. of 1 in 10,000 per 100 sq. cm. stomach area would be about 90 c.c.—that is, 9 c.c. (3 drachms) of the 1 in 10,000 solution, followed afterward by about 5 c.c. (1½ drachms) of the 1 in 1000 solution, diluted (that is, 50 c.c., or nearly two ounces of 1 in 10,000 solution).

The experiments seem to show that in a case of cyanide poisoning the following procedure is advisable:

1. Adrenalin be immediately given.
2. Then Martin's antidote if it be at hand.
3. Then wash the stomach out; and,
4. After having washed the stomach out, administer some more adrenalin.

The object of the latter is to "follow up" any cyanide which has escaped the washing-out process or Martin and O'Brien's antidote, and so retard its absorption; for Martin and O'Brien found that if death does not ensue within thirty minutes of administering the cyanide, the animal will live. It might also be advisable to give a brisk saline purge soon afterward. Should

Martin's antidote not be at hand, the order of procedure should be 1, 3, 4, as above.

There are two further considerations which must be taken into account before the recommendations made above are to receive acceptance. First, is the adrenalin accepted by hydrochloric acid of the gastric juice or by the pepsin? This question has been answered by Oliver and Shafer, who showed that gastric digestion (by pepsin-hydrochloric acid) for twenty-four hours does not seem to lessen the physiologic properties of extract of suprarenal gland. Secondly, how long will the adrenalin introduced into the alimentary canal continue to act on the lining membrane? The results obtained by Oliver furnish the desired information. To quote from his paper: "Suprarenal extract invariably produces the most decisive contraction, and one, moreover, which persists for thirty to sixty minutes. The constriction is equally pronounced whether the spinal cord remains intact or is destroyed. The velocity of the circulation is likewise lessened, and at the acme of the constriction the onward flow may cease." Oliver's statement that these facts may be verified on the inflamed conjunctiva of a rabbit has been confirmed. It was also found on administering adrenalin solution to a rabbit with a full stomach, that there is a constricting action not only on the vessels of the gastric mucosa, but also on the vessels of the mucosa some inches down the small intestine, which lasts for quite fifteen minutes.

In the case of stychnine and aconite, too, a number of experiments were performed, and the efficiency of adrenalin in delaying absorption conclusively proved. With these poisons the administration of adrenalin until the stomach can be thoroughly emptied is indicated, and in them the stomach must be emptied and the poison got rid of, otherwise the poison will be absorbed and exert its action on the body when the action of the adrenalin on the stomach has ceased, as shown by one of the experiments.

Experiments were also tried with other rapidly-acting poisons, such as potassium binoxalate (neutral), but the gastric mucosa was found (post-mortem) corroded, and

free blood was found in the stomach, so that disturbing factors due to erosion and not remediable by adrenalin were present.

Urticaria Treated with Adrenalin. Swann[3] says that from the results obtained in six cases of urticaria it seems probable that the vessels in the wheals are in a state of optimal tonus from the action of adrenalin, and that on them the drug has an unusual and selective effect. In contrast to asthma, however, the rise of blood pressure which occurs is in most cases greater than usually follows subcutaneous injection of adrenalin in other types of disease, or in health, and may be due to a generally relaxed condition of the arterial tree, which one would expect to be present in such cases. A relationship between the rise in pressure and the subsidence of the eruption is shown by a chart, where it is readily seen that in every instance except one the wheals began to fade soon after a marked rise in pressure had occurred, and continued to fade while the pressure was rising or still above normal. On the other hand, the inconstancy of this relationship is shown in one case, in which the rash nearly disappeared before any rise of blood-pressure took place, and by the fact that in most of the cases the wheals did not reappear for some time after the pressure had again fallen to its starting-point. It is therefore by no means certain whether the disappearance of the rash depends entirely on the local contraction of the blood-vessels or whether it also depends on some other process. Meltzer and Auer have shown by animal experimentation that adrenalin retards absorption from the tissues into the blood and transudation from the blood into the tissues, and that this effect is maintained well after the blood pressure has fallen to normal. It is possible that this may be instrumental in causing the wheals to disappear, though it would seem more logically to be a factor in preventing their reappearance.

The effect produced in these cases of urticaria suggests that adrenalin might be used to advantage in certain more serious yet similar conditions. One such con-

(3) Amer. Jour. Med. Sci., March, 1913.

dition is angioneurotic edema in its various forms. At present, except for general hygienic management, little can be done in these cases, and it will be interesting to see what can be accomplished with repeated doses of epinephrin. In cases of edema of the epiglottis or larynx due to disturbance of this type, adrenalin given intravenously, if its action were similar to what it has been in these cases of urticaria, might well be the means of saving life, when the local application of the drug and other measures have failed.

Another such condition is anaphylaxis with severe bronchial spasm and edema. From its physiologic action on the bronchial and peripheral vessels, adrenalin, theoretically, should be the most specific of any drug in these cases. That it may relieve the asthma of anaphylaxis, at least temporarily, is well known to clinicians, and its effect on certain urticarias of this type has been shown in this paper. Whether or not it could be made beneficial in every case if the doses were properly manipulated is a question of some interest. Swann states that he knows of one extreme case of anaphylaxis with dyspnea, but without edema, in which adrenalin had no apparent effect, though it is impossible to say what larger and more frequent doses might have done. We know too little, however, of the possible reactions which may in turn follow the primary dilatation produced by adrenalin to give more than moderate doses in such grave cases, and this point requires further investigation.

The rapidity with which the erythema has faded in Swann's cases suggests the possibility of using adrenalin to differentiate rashes of purely vasomotor origin from those of other types. Hayes suggested its use in diagnosticating serum erythema from the rash of scarlet fever. Swann has not yet had an opportunity of trying it in a case of scarlet fever, but it is rational to expect that the scarlet rash would fade but little or not at all.

Suprarenal Extract in Renal Hemorrhage. The advantages of this method of treatment are enumerated by H. L. Kretschmer[4] as follows: If by this simple

(4) Jour. Amer. Med. Ass'n., July 5, 1913.

procedure one is able to control the renal bleeding, the condition of the patient's urine may be studied at a time when it is free from large quantities of blood. In cases in which there is a severe degree of secondary anemia, due to the loss of large quantities of blood, the patient may be put on a general tonic treatment besides the suprarenal extract, until such improvement is reached as will render operation a safe procedure. This method of treatment may be the means of avoiding nephrectomy. The drug may be employed temporarily, at least until a positive diagnosis of the cause of the bleeding can be made.

Action of Epinephrin on Veins. Considerable interest attaches to the action of epinephrin on the great veins near the heart. It has long been known that in the mammal the great veins, which correspond in some ways at least to the sinus venosus in the frog, beat rhythmically with the heart proper. J. B. Gunn and F. B. Chavasse[5] have previously been entirely successful, however, in obtaining a spontaneously contracting ring preparation of the superior vena cava, and have now found that a quiescent ring preparation of the superior vena cava of sheep, near the heart, can be made to beat vigorously and rhythmically by the action of 1 to 20,000 epinephrin. The action of the drug is a continuous stimulus to which the muscle responds by discontinuous (rhythmic) contraction. The experiments further indicate that the accelerator-augmentor nerve supply of the heart and the rhythmically contractile tissue extend up the superior vena cava for at least 6 to 8 mm. from the veno-auricular junctions in the sheep's heart. The induction by epinephrin of rhythmic contraction in the quiescent superior cava, seems to the authors, on the whole, in accordance with the myogenic theory of mammalian heart rhythmicity.

They also demonstrated that 1 to 100,000 epinephrin, acting on ring preparations of veins remote from the heart—jugular, mesenteric, superior and inferior vena cava—cause a diminution in their caliber, as has already been shown to be the case with arteries. These

(5) Proc. Roy. Soc., Series B, March 6, 1913.

veins therefore probably contain veno-constrictor fibers from the thoracico-lumbar sympathetic system.

Action of Adrenalin on the Coronary Arteries. F. Meyer,[6] from experimenting on animals, finds that the administration of adrenalin produces remarkable acceleration of the coronary circulation, the result of increased blood pressure, from the heightened action of the heart. As shown also by other authors, adrenalin causes an increase in the caliber of the coronary vessels, as well as an increased flow of blood through them.

Lymphatic Gland.

Lymphatic Gland Extract in the Treatment of Enlarged Tonsils and Adenoids. H. T. Ashby[7] states that the mere presence of adenoids does not constitute a disease, and that they only become pathologic when they hypertrophy and cause trouble. In infancy and childhood the lymphatic structures are at their maximum exactly at the time when enlarged tonsils and adenoids are commonest, and it is one of the functions of the lymphatic tissue to form the lymphocytes. Now, it is a peculiar fact that children with enlarged tonsils and adenoids rather have a diminution of lymphocytes in the blood, and there is also an increase in the total number of leukocytes. For this reason, it looks as though the enlargement of the tonsils and adenoids were an attempt on the part of Nature to supply the deficiency in the other lymphoid tissues of the body. At the age when enlarged tonsils and adenoids are commonest (2 to 5 years) the lymphocytes are normally beginning to decrease from the high percentage found in infants to the adult standard, and the thymus is also decreasing in size. The author believes that these two facts support the view that the adenoids and tonsils are an attempt to augment the lymphoid tissue of the body. It is also a common fact that when the enlarged tonsils and adenoids are removed carefully by a competent surgeon before the age of about 5 years they are very liable to recur, so that Nature, as it were, makes a second

(6) Berl. klin. Wochenschr., May 5, 1913.
(7) Brit. Med. Jour., May 31, 1913.

attempt to raise the amount of lymphoid tissue, or at least supply the body with some secretion from the lymphoid tissue, which it needs at this age. If one could supply these children with lymphoid tissue artificially, there would be no need for the enlarged tonsils and adenoids, and in consequence they would go down, and it is on these lines that the author has been working. Up to the present time he has treated about thirty cases of enlarged tonsils and adenoids with lymphatic gland extract, in doses of 5 grains, three times a day. No bad effects have been observed, and nearly all the children have improved in a very satisfactory way; the snoring and noises in breathing have disappeared, and the tonsils have diminished in size.

Pituitary Extracts.

[With the increase in knowledge of organotherapy, preparations of the pituitary body have been made by many of the manufacturing chemists and pharmacists. These pituitary extracts—pituitrin, pituglandol, etc.—have been much used in Europe and to a lesser extent, perhaps, in this country. European obstetricians, especially the Germans, have reported good results from their use, but some American obstetricians, notably De Lee, have found the pituitary extracts unsatisfactory. At present the reports concerning these preparations are too conflicting to permit safe conclusions regarding their value.]

Treatment of Acute Lowering of Blood Pressure with Pituitary Extract. Klotz[8] says that by intravenous pituitrin injections the toxic fall of blood pressure is controlled to a moderate degree and that this action lasts for some time. The good effects are generally enhanced by the addition of normal salt solution. The injection should be made at the very beginning of the fall in blood pressure, and may be repeated at any time after the effect has worn off, though it should not be delayed more than twelve hours. One need not fear any cumulative effect. Stimulants, such as camphor, digalen, etc., may also be employed. Pituitrin is likewise

(8) Med. Klinik, June 22, 1913.

of service in the toxemia of peritonitis, and the infection of the pneumococcus and diphtheria bacillus and pyocyaneus, as well as in circulatory disturbances. Delille states that he has had good results with pituitrin in both diphtheria and pneumonia.

Pituitary Extract in Placenta Previa. Trapl[9] reports the results obtained in 16 cases of placenta previa treated with pituitrin. Thirteen living children were born; of the 3 born dead, 2 were found to have died before the pituitrin was employed. In the other case, fetal death occurred 4 hours after the injection, and it is doubtful, therefore, whether it was due to the latter. The course of the labor was accelerated in the majority of the cases. If only a small portion of the placenta presents, and especially if the vertex presents and the labor has advanced to such an extent that the cervix is shortened and sufficiently dilated, the membrane, he says, should be ruptured and pituitrin given. This plan is best adapted for a marginal variety of placenta previa, for if a larger segment presents, the engagement of the head is interfered with. In other cases, this author recommends combined version with injections of pituitrin. The resulting labor pains force the breech against the loosened segment of the placenta, and completion of the delivery may be safely awaited, no attempts at extraction being necessary except those directed to the arms and the head. When dilatation is not sufficient to admit of combined version, a small dilating bag may be inserted, or a vaginal tampon applied. After this has led to sufficient dilatation, he advised combined version with injection of pituitrin.

Serious Complications Following Use of Pituitrin. Grumann[1] reports the case of a woman of 32 in labor with her first child. The cervix was rigid, the membranes ruptured, the labor pains weak and far between, the os dilated about the size of a silver quarter. The third day an injection of pituitrin was given; two hours later a second injection, and the cervix was slit. Five hours later a third and two hours later a fourth

(9) Monat. f. Geburts. u. Gynäk., October, 1912.
(1) Münch. med. Wochenschr., July 1, 1913.

injection of pituitrin were given. They were followed in half an hour by labor contractions so excessive that they kept up practically continuous for two hours, with spasmodic closure of the cervix. Finally pain in the sacral region became intense, requiring morphin; the temperature rose, and also the pulse, and a mixture of amniotic fluid and stool escaped from the cervix. As a consequence of the two hours' pressure of the fetal skull on the sacrum from the intense contraction of the uterus, under the action of the pituitrin, the tissues between had been destroyed and a fistula was formed between the rectum and the cervix. The child was delivered with forceps and died the seventh day from sepsis.

Pituitrin in Obstetrics. J. K. Quigley[2] reviews the literature and contributes his own observations on twenty-six cases, concluding that: 1, in pituitary extract we have the most powerful stimulant to uterine contraction yet discovered; 2, its greatest value is in its use in uterine inertia; 3, the ideal time for its administration is in the second stage of labor, but good results follow its earlier use; in such cases it is usually necessary to repeat; 4, no untoward results were seen in his series, for either mother or child; 5, its use shortens the third stage; 6, it renders post-partum catheterism almost never necessary. The dose is usually 1 c.c., given intramuscularly, repeated in from 60 to 90 minutes if there is no result, or if its effects wane. Elevated blood pressure, myocarditis, nephritis, marked disproportion between the fetus and the pelvic bony canal, or other obstruction, constitute the contra-indications to its employment.

Treatment of Hemoptysis by Pituitrin. Rist[3] states that the results which he has obtained from the use of pituitrin in human beings suffering from hemoptysis have been most successful. In ten cases immediately following the injection of the pituitrin intravenously there was complete arrest of the hemorrhage, and the local physical signs over the area from which the blood

(2) New York State Jour. of Med., June, 1913.
(3) Bull. et Mem. de la Societe Méd. des Hôp. de Paris, April 24, 1913.

was supposed to come were materially modified. In one patient suffering from fibroid phthisis, who was subject to severe hemorrhages, the injection of 0.5 c.c. of pituitrin was followed by extreme pallor and vertigo. The hemorrhage was increased for two or three minutes, but after this completely arrested. Four hours later a second hemorrhage was immediately stopped by the subcutaneous injection of 0.5 c.c. of pituitrin. He found that the intravenous injection of pituitrin sharply raised general arterial pressure from 8 to 10 millimeters. In one or two other instances a fleeting sense of vertigo was experienced when the drug was given intravenously.

Bernard, in discussing Rist's paper, confirms his observation that pituitrin arrests hemoptysis rapidly. He also has noticed after intravenous injections, pallor of the face, slowing of the heart, and a tendency to syncope, but none of these symptoms was followed by any sequelæ which caused alarm, and they were exceedingly fleeting. Possibly it would be wiser in most cases of hemoptysis to give the drug hypodermically. In another paper published in the same issue of the same journal Emile-Weil refers to a paper published by Boye and himself in the Proceedings of the Society of Biology of August 23, 1909, in which they seem to show that the extract of the posterior lobe of the pituitary body seems to diminish coagulation of blood in a test-tube, but when given intravenously very greatly accelerates coagulation. He offers this as a possible explanation of the excellent results which were obtained by Rist and by Wiggers.

Thyroid Preparations.

Thyroid Origin of Hemorrhagic Uterine Disease. Recent research which demonstrates anew the close relations between the thyroid and the genital organs is reviewed by Sehrt.[4] Excessive or insufficient functioning of the thyroid causes changes in the blood, a relative reduction in the neutrophil leukocytes and a relative or absolute lymphocytosis. With excessive thyroid functioning the coagulability of the blood is much reduced, while with

(4) Münch. med. Wochenschr., May 6, 1913.

insufficient functioning the coagulating time is much hastened. The effect of abnormal conditions in the thyroid on the coagulating power of the blood throws light on certain cases of hemorrhagic uterine disturbances, suggesting that they are abortive forms of myxedema. In 20 pure cases of hemorrhagic uterine disturbances he found in 13 of the patients pronounced signs of thyroid hyperfunctioning and in all but one the coagulating time was from eight to four minutes in contrast to the nine or ten minutes with normal blood. The viscosity was frequently below normal, in a number only half of the normal figure. These findings parallel remarkably those Kocher obtained in 155 cases of subnormal thyroid functioning (myxedema, cachexia strumipriva). Sehrt cites further arguments to sustain the view that thyroid insufficiency is a prominent factor in pregnancy tetany and possibly also in eclampsia. It is possible that all these conditions are different stages of the same disturbance in thyroid functioning. In any event, the condition of the thyroid should be ascertained in all cases of eclampsia and this is easily done by examination of the blood, abnormally rapid coagulation testifying to a lack of the normal thyroid secretion. One of his cases was peculiarly instructive; a young woman with the hemorrhagic metropathy had borne twins three years before and had had severe eclampsia at the time. At present the coagulation time is reduced to five minutes and with a relative neutrophil leukopenia of 45 per cent, there is lymphocytosis of 48 per cent in contrast to the normal 20 to 25 per cent. It is possible also, he remarks, that the thyroid may be involved in the tendency to habitual abortion. Cases have been reported in which women with goiter who have been married for several years without conceiving, bore children after thyroid treatment. Cretin mothers are liable to habitual abortion for a time, but finally bear living children. The habitual abortions of women with infantile uterus suggest that the thyroid likewise may be in an infantile condition. It seems to be established now beyond all question that syphilis is not responsible for all cases of habitual abortion. Sehrt's research indicates that thy-

roid treatment may have a wider sphere of action than has hitherto been deemed possible.

Contraction of Palmar Fascia and Thyroid Treatment. Gilbert[5] refers to 5 cases of Leopold-Levi in which the continued administration of 0.1 gm. (1½ grains) doses of thyroid powder brought about marked benefit in Dupuytren's contraction, the fibrous tissue becoming greatly softened and the functions of the involved fingers in large measure returning. In two other very marked cases the results were negative. Leopold-Levi avers that in view of the prompt and continuous action of the remedy in the cases in which it proved useful, as well as the other symptoms of faulty thyroid function present in these patients and relieved by the treatment —subacute rheumatic attacks, pain, headache, alopecia, rigidity of the neck, joint creakings, cyanosis, and edema —the palmar fascial contraction in these cases must have been of thyroid origin.

Thyroid Treatment in Epilepsy. Gelma[6] describes two cases of typical epilepsy treated by him with daily doses of 0.5 gm. of thyroid extract. The epileptic attacks ceased, nutrition and general health improved and there was a marked gain in the mental condition. Thyroid gland changes are frequent, but not universal in epilepsy, and thyroid treatment is worthy of trial not only in marked cases of goiter and myxedema, but in those manifesting the milder symptoms of hypothyroidism.

Thyroidin and Associated Internal Secretions with Arsenic in Eye Diseases. S. B. Muncaster[7] has prescribed thyroid associated with adrenal extract and sodium cacodylate in treatment of some diseases of the eye with good results. This association of internal secretions is used in a lowered state of nutrition where the ductless glands are not properly performing their functions. This condition if not relieved is very apt to lead to auto-intoxication.

When the ductless glands are diseased or destroyed

(5) Bull. de l'Acad. de Méd., Jan. 14, 1913.
(6) Rev. de Méd., January, 1913.
(7) Jour. Ophth. and Otol., October, 1912.

more work is thrown on the kidneys, causing albumin and casts to appear in the urine. After treatment in a number of cases with the combination of substances above indicated, it has been found that the albumin and casts have disappeared. The depressing effect of thyroidin in the treatment of obesity may also be overcome by giving at the same time adrenal extract and sodium cacodylate.

In cases of retinitis pigmentosa and chorioiditis, where there were old pigment deposits, the author has noticed beneficial effects following the administration of the following:

Thyroidin .....gr. j
Adrenal gland.....gr. 1/60
Sodium cacodylate.....gr. 1/200

Thyroid Treatment of Myxedema. Zuber[8] reports the case of a young man who has taken thyroid treatment systematically for 13 years. At the age of 8 he was the size of a child of 2, and although, under the influence of the thyroid treatment then instituted, he has developed both physically and mentally, he has never regained those six years he lost, his size and mental standing now being those of a normal, diffident youth of 15. In the discussion that followed this report, Ausset commented on the way in which the myxedematous improve to a certain extent under thyroid treatment and then seem to reach a stationary stage. At this point he has found it useful to combine the extract of other glands with the thyroid treatment; improvement progresses rapidly under the addition of hypophysis extract. Lesne adds epinephrin also, the arterial pressure being generally low in myxedema.

Thyroid in Infantile Eczema. Rocaz[1] believes that in every case of infantile eczema, not attributable to disturbances of the alimentary tract, which does not respond to good hygiene of the digestive apparatus, thyroid medication should be tried. The initial dose of the thyroid is 0.05 gram (¾ grain); at the end of some ten days he gradually brings it up to 0.1 gram (1½

(8) Bull. de la Soc. de Péd., February, 1913.
(1) Le Courier Méd., No. 33.

grain). This dose must be exceeded only in the case of older children.

OXYGEN.

Oxygen-Therapy for Toxemia of Gestation. Arguing that during pregnancy the mother's body requires excess of oxygen, and assuming that some of the toxemias of that period (headache, edema, dyspnea, etc., the usual precursors of eclampsia) are the consequence of insufficient oxygenation, G. P. Shears[2] reports that good results have followed, in several instances, from the liberal introduction, either by inhalation or injection, of pure oxygen. He promises further reports. This suggestion, he thinks, is worth following up.

PARALDEHYDE.

Poisoning with Paraldehyde. Paraldehyde is a relatively harmless drug which has been given in large doses (50 to 150 gm.) without causing any severe symptoms. It can thus be understood that but few cases of poisoning have been described in literature. A patient of Fornaci and Quarelli[3] suffered severely from insomnia and had employed all the customary hypnotics in rather large doses. As soon as tolerance was established a change was necessary, and finally paraldehyde was resorted to. In the course of five years from 12 to 15 gm. daily were taken of this drug.

Psychic disturbances finally appeared, and during the last week the patient considerably increased the dose and consumed as much as 500 gm. For eight days the patient was in acute delirium, with suicidal tendencies and marked motor excitement closely resembling that of alcoholic delirium tremens, except that there was a slight difference in the hallucinations of sight. The delirium reached its acme in the first four days. During the first two days the breath smelled very strongly of the drug. The temperature was high, the pulse weak and rapid and the perspiration very profuse. During the psychomotor stage a severe epileptic attack set in. Improvement began with the fifth day and rapidly progressed

(2) Medical Rec., p. 66, 1913.
(3) Berlin klin., Wochenschr., Dec. 23, 1912.

so that the patient was physically and psychically normal again by the ninth day. The treatment consisted of lukewarm packs, small doses of paraldehyde, and large doses of bromide, but little improvement was seen until opium was resorted to. Recovery was complete, except that the insomnia persisted.

PEPTONE.

Peptone in Hemophilia and Purpura. Nobecourt and Tixier report[4] a case of familial hemophilia in which repeated subcutaneous injections of a 5 per cent solution of peptone (Witte) kept the tendency to hemorrhage under control. The boy of 10 was given 67 injections between May, 1910, and October, 1912, series of three or four injections being given at intervals or when there was extravasation of blood in a muscle or joint. At first the blood showed no signs of coagulation for 3 hours and the venous blood, for 24, but now blood from the finger commences to clot in 20 minutes and coagulation is complete in 5 more. The reds number 4,576,000, whites 9,000 and the hemoglobin is 95 per cent. Injections of serum had proved ineffectual in this case, and in the course of time the peptone seemed to prove less effectual as a preventive of accidents, although retaining unimpaired its influence on already established lesions. The hemorrhages stop after two or three injections of the peptone, and they do not leave the little patient so weak as before the peptone treatment. In six cases of purpura the peptone had a marked curative action in some, but it was less evident in the others, especially in the more chronic cases.

PERHYDROL.

Perhydrol for the Prevention of Peritonitis. The treatment of the peritoneum after an operation where contact with septic material can not be avoided has always been a difficult matter. Thus, after operations for appendicitis abscess, pus tubes or infected tumors or where there is an injury to the intestines, the patient is in grave danger of peritonitis, unless special precautions

(4) Arch. des Mal. du Coeur, June, 1913.

are resorted to. The two preparations which have been employed most extensively by Otto v. Herff[5] are camphor oil 1 per cent and perhydrol. The former is applied to the peritoneum in amounts of from 20 to 50 c.c., which are absolutely harmless. The flatulency and the vomiting are considerably diminished, but in severe infections there is hardly any influence on the disease. It is certain, however, that the camphor oil never does any harm. Perhydrol was employed either alone or diluted with twice the amount of water. Perhydrol was used most extensively after abdominal hysterectomy. After removal of the uterus and proper drainage through the vagina, the edges of the peritoneum are fixed with clamps and the cavity then treated with from 20 to 30 c.c. of the preparation. The foam is removed and another 10 c.c. is applied. Only about a dozen cases have been treated in this way so far, but the results have been encouraging. It is not likely that the application of perhydrol will favor the formation of adhesions. In one case in which the patient died as a result of embolism, the autopsy showed no sign of adhesions.

Perhydrol in Nasopharyngeal and Oral Infections (General Paralysis, Poliomyelitis). The value of perhydrol in combating nasopharyngeal and oral infections is confirmed by Simon Flexner[6], of the Rockefeller Institute for Medical Research, New York, and Paul A. Lewis, of New York, whose experimental investigations of epidemic poliomyelitis, carried out during the past several months, have added a large number of important facts to the knowledge of this disease. In their seventh note, on "Active Immigration and Passive Serum Protection" in the *Journal of the American Medical Association,* the authors state: "In view of the fact that the virus of poliomyelitis can enter the nervous system through the abraded mucous membrane of the nose, we have tested the effects on the virus of hydrogen peroxide and some other disinfecting agents. The virus is quickly destroyed by a dilution of perhydrol containing 1 per cent of hydrogen peroxide."

(5) Gynäk. Rundsch., No. 1, 1913.
(6) Lancet, Nov. 14, 1912.

This authoritative statement confirms that made by W. Ford Robertson, pathologist to the Scottish Asylums, Edinburgh, who in a paper on "General Paralysis and Tabes Dorsalis" read before the Interstate Medical Congress at Melbourne, stated:

"We have endeavored to combat the nasopharyngeal and oral infections by local measures. In view of the evidence of the destructive action of oxygen upon certain strains of the special bacilli, it occurred to me that perhydrol would be worthy of trial in the form of a nasal spray. We have used this extensively in a 1 per cent solution, both as a nasal spray and as a mouth wash (applied daily or every other day), and there can be little doubt that distinct benefit has resulted in many cases."

PHENOL.

Phenol in Tetanus. P. Kintzing[7] reports seven cases of tetanus successfully treated by means of the method introduced in 1892 by Bacelli, namely, the hypodermic injection of phenol. The author used a solution of pure phenol of 10 per cent strength, made by dissolving the deliquesced crystals in sterile water. This solution was then diluted to suit the case, generally to 30 or 40 minims and administered by hypodermic injections deep into the muscles; the dose is repeated at intervals of three hours in the beginning, the interval being increased as improvement manifests itself. The full adult dose employed was ten drops of this 10 per cent solution, equaling practically one grain of pure crystalline phenol. As a precaution against soreness or suppuration the author has sometimes diluted with sterile water the stated amount, 5 drops, to the capacity of a 25 or 30-minim syringe, injected this into one buttock, following immediately with the remainder of the dose into the opposite buttock; the succeeding injection may be made into the deltoids or pectoral muscles, if deemed advisable. The author regards the antitoxin treatment of tetanus as far from ideal and his own experience disappointing.

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(7) New York Med. Jour.

Phenol-Camphor in Cold Abscesses, etc. Pohl's[8] experience has confirmed, he says, the statements of those who called attention to the way in which camphor seems to annul the corroding action of phenol. He used it in the formula, 30 parts phenol, 60 parts triturated camphor and 10 parts alcohol, injecting this mixture directly into the lesion in cases of old rebellious effusions and destructive inflammatory processes in joints, and recurring rheumatic joint affections displaying a tendency to develop into arthritis deformans. In the course of the three years since he has been doing this he has even come to use this treatment for acute suppurative processes in joints and for articular rheumatism. The results have been good except that general sepsis did not seem to be influenced by the injections. He has had only two cases of this latter type; one patient died. In both cases the temperature dropped decidedly after the phenol-camphor injections. He has given the injections at intervals of 2, 4 or 8 days to a number of patients, never giving more than from 2 to 5 c.c., and except for slight carboluria has never witnessed any by-effects. There does not seem to be any reaction in a sound joint, but an inflamed joint swells and may become very painful, requiring application of ice or aluminum acetate; sometimes it may be necessary to draw off some of the effusion. The second injection induces merely a slight reaction, and the third scarcely any at all. The reaction is the more pronounced in the chronic cases. He calls attention in particular to a case of tuberculous caries of the ribs in which, after nearly a month's treatment with iodoform-glycerin, the process seemed on the point of breaking through. After three injections of the phenol-camphor and aspiration of the exudate, the process retrogressed and there was no visible evidence of its presence two weeks later.

PHENOLSULPHONEPHTHALEIN.

Phenolsulphonephthalein in Estimating the Functional Activity of the Kidneys. Charles Goodman[9]

(8) Zentralb. f. Chir., May 24, 1913.
(9) Jour. Amer. Med. Ass'n., July 19, 1913.

refers to a former paper in which he set forth the advantages of this test. He finds that in clinical influenza the small output of phenolsulphonephthalein is out of line with the findings in other general diseases, which show a good output as a rule when there is clinically no evidence of renal involvement. The findings in regard to the value of this test in nephritis, both from a diagnostic and prognostic viewpoint, confirm former conclusions, and the test reveals the degree of functional derangement, and whether the nephritis be acute or chronic. In several of the writer's cases this test revealed a degree of renal insufficiency not evident from the clinical condition of the patient, but confirmed by the fatal outcome of the case. The test has demonstrated renal insufficiency in instances in which operation was contemplated, and in which, though chemical and microscopic examinations were negative, subsequent developments confirmed the existence of the renal insufficiency. Goodman's findings, in cases of ureteral or renal obstruction agree with those of Rowntree and Geraghty in that he found a marked improvement, as indicated by the test, following the removal of the obstruction. In unilateral and bilateral renal disease, the test has revealed the functional capacity of each kidney, and to such a degree as to be of assistance in determining on the course of operative procedure. An absence or very small output of the dye from one kidney, with an increased output from the other side, indicates a seriously diseased kidney on the one side, with a compensatory hypertrophy of the other kidney.

PHOSPHORUS.

Phosphorus in Epilepsy. Leubuscher[1] mentions among remedies indicated in epilepsy those which act on the blood vessels and those which make for disinfection of the alimentary canal. The observation has been made recently that phosphorus exerts power over tetany, an affection commonly believed to depend on autointoxication. He has therefore given phosphorus in a number of cases of epilepsy, giving it over prolonged periods of

(1) Deutsche med. Wochenschr., March 13, 1913.

time. In a number of cases the frequency of the attacks was notably lessened. Even after cessation of the treatment the benefit continued and this in the absence of bromide or other therapy. The cases were as a rule severe in type and of long standing. With one exception the epilepsy was genuine in type. The rationale of the treatment is difficult of explanation, and Laubuscher is able to say only that we know that phosphorus has the power of modifying metabolism in some manner.

Phosphorus and Cod Liver Oil in Rachitis. In the opinion of W. Gessner,[2] infantile rickets is a typical disturbance of metabolism affecting chiefly the metabolism of the fats at a time when under normal conditions the fetal red bone marrow is changed to yellow marrow. Special requirements have to be met at this period and the customary mixtures of cow's milk often prove inadequate. The fat in cow's milk cannot be sufficiently utilized by the organism which then manufactures fat from the carbohydrates ingested. The result is a functional insufficiency of fat metabolism and the necessary energy to convert red into yellow marrow is lacking. The development of the bone is disturbed and rachitis develops. Thus, in the opinion of the author, rachitis can only be cured by giving a readily assimilable fat, such as cod liver oil. The addition of phosphorus to the oil is an advantage since it increases the oxidation processes to a marked degree and rapidly checks the secondary demineralization. Inasmuch as the fats are of the greatest importance for the development of the brain and the spinal cord the nervous symptoms so common in rickets find a ready explanation.

PILOCARPINE.

Pilocarpine in Pruritis. George E. Nour[3] advocates pilocarpine as a useful remedy in the treatment of pruritis, especially of pruritis vulvae, which, he says, is relieved by ¼ to ⅛ grain doses of the nitrate or the hydrochloride. He has also repeatedly found this drug of value, hypodermically given, in 1/20 grain doses,

(2) Berlin klin. Wochenschr., April 14, 1913.
(3) Med. Council, June, 1913.

gradually increased to ¼ grain, in the treatment of tuberculosis. This application, however, certainly should be qualified, on account of the depressing character of the drug. The pilocarpine assuredly is contra-indicated when the patient is suffering from night sweats.

The author claims that pilocarpine in small doses, taken by the mouth with pepsin and hydrochloric acid, by greatly increasing the mucous and salivary secretions of diphtheria patients, facilitates the expulsion of the diphtheritic membrane. For erysipelas, he recommends the use of fluid extract of jaborandi, although, certainly, the alkaloid pilocarpine is a much more serviceable and satisfactory drug in this disease. Pilocarpine is the remedy *par excellence,* he says, in the asthenic form of erysipelas; it should not be given in the asthenic forms of the disease.

Nour also finds pilocarpine efficient in several other conditions; for instance, as a galactagog; in amblyopia, choroiditis, iritis, and other eye affections, and also in uremia and puerperal eclampsia, and in mumps, eczema, herpes, prurigo, acne.

As Nour says, "pilocarpine is a charming remedy, but its depressing effect on the heart should never be forgotten."

POTASSIUM.

Spasm-Producing Action of Potassium. Lust[4] relates a case of tetany following severe gastro-intestinal disturbance in a child of 2. The remarkable feature of the case was that the tetany came on regularly when there was marked retention of water, and it subsided with this. He thinks it is evident that the tetany was due to substances retained in and with the water, and everything seems to point to the potassium salts in the water as the substances to be incriminated. He is inclined to believe that potassium and sodium salts have a direct spasm-producing influence, while lime has the opposite effect, reducing the tendency to spasms. The sodium and still more the potassium salts display their spasmogenic influence sometimes in doses no higher than the proportions of these salts usually present in milk.

(4) Münch. med. Wochenschr., July 8, 1913.

Potassium Permanganate as a Local Anesthetic to the Genito-urinary Mucous Membranes. W. M. Barton[5] accidentally found that the injection of a solution of potassium permanganate into the urethra and bladder causes a transitory but complete desensitization of the mucous membrane of the anterior and posterior urethra, of such a degree and character as to permit the painless passage of sounds. From a series of experiments, the writer has found that anesthesia of the mucous membrane of the urethra so completely and satisfactorily produced by solutions of potassium permanganate in the strength of 1 to 2500 or even in 1 to 5000, is incomplete and unsatisfactory when the dilution is raised to 1 to 10000. The minimum dilution producing satisfactory anesthesia is 1 to 5000. Solutions in excess of 1 to 2000 should not be used in the posterior urethra.

PSYCHOTERAPY.

Psychotherapy in Practice. Vogt[6] discusses this from a general standpoint and then from the relations between the physical and the psychic and the nature of and treatment of psychoneurotic disturbances in general.

He reviews the methods in vogue and their aims, devoting much space to Freud's psychanalysis. This consists essentially of two features, he repeats, "psychocatharsis and sexual analysis." The latter feature, he remarks, has become so morbidly hypertrophied that it has thrown discredit on the whole system, although many still regard Freud as the Copernicus of psychiatry. Binswanger says: "Freud kneels on the conscience of his patient." It is beyond question, however, Vogt continues, that psychic trauma may occur as the result of fright, worry, a sense of shame and distress. He dwells in particular on the importance of psychotherapy in the training of children inclined to be extra nervous, especially the children of parents with a tendency to degeneracy. Calmness and firmness are necessary in their training, and the first days of life are none too early to commence the psychotherapy. The child should be trained

(5) Jour. Amer. Med. Ass'n., July 19, 1913.
(6) Therap. Monats., April, 1913.

to bear pain and should never be kept away from the sports and games of children of his own age. The "hard school of the street" is particularly needed for such children, as also training in simplicity, self-control and self-confidence, truth and an innate or cultivated abhorrence of the unbeautiful and the vulgar, and avoidance of luxury. Everything should be done to cultivate a healthy cheerful outlook on life and to divert the child's attention from books and theories to practical things, while cultivating a habit of observation and enjoyment of the every-day things of life. In all these things, he emphasizes, the physician can be of infinite guidance and help. It often happens that he will have to counsel the parents and educators, for the first and greatest need is naturally a sound and true example. Parents who cannot control themselves, of course cannot train their children in self-control. (The term "psychocatharsis" applied to Freud's method of psychanalysis is from the Greek katharos, "pure," meaning a cleansing process for the soul and mind. "Catharsis" is too good a word to be kept for the intestines alone.)

QUININE.

Quinine in Hemoglobinuric Fever. Long[7] expresses the belief that if quinine can be given from the very first, before the blood-making centers have become partially exhausted and before the patient's vital resistance is worn out by prolonged toxemia, and if the patient is strong enough to live through the crisis which is absolutely certain to follow its administration, quinine can be given with probably a more rapid recovery than if it be withheld. But if the patient is seen for the first time late in the attack, or his vitality is wasted by chronic malaria, cachexia, or other disease, the chances are against his living through the "quinine crisis," as it is convenient to call it. If the patient is seen for the first time on the day after the attack, quinine is out of the question, because hemoglobinuric fever itself is not amenable to quinine, as Deaderick plainly states. To begin with, the patient does not need it, because the

(7) Charlotte Med. Jour., March, 1913.

greater portion of the parasites have been destroyed, and quinine has no effect on the toxins from which the patient is now suffering, and only adds to the load on the excretory organs, which are already overworked. But the fact that there are no parasites to destroy will in no wise detract from the harmful effect of the drug on the red cells, for we must remember when we give quinine in this condition we supply the one thing necessary to form a substance which is just as toxic to erythrocytes as it is to parasites. Mannaberg's series of examinations show that on the day after the attack the parasites are present in the blood in only 17.1 per cent. of cases, while on the day of the attack and the day before the attack they are present in 63 per cent. and 95.6 per cent., respectively. After the day of the attack the parasites are mostly destroyed, anyway, and about the only thing the quinine can do is to cause hemolysis of what blood the patient has left, and put him to the trouble of excreting it at a time when he can hardly excrete enough malarial poison to keep himself alive.

The chills or "rigors" occurring during the attack are not the result of sporulation of the parasites, as has been supposed, but may be regarded as having their origin in the mingled toxic products of the broken-down parasites and red cells. These rigors have no periodicity and are liable to come on at any time following a chill or exertion of any kind, or from anything which temporarily lowers the resistance of the patient. They are almost invariably followed by an increase of the hemoglobinuria and general aggravation of the symptoms, but this can hardly be regarded as the effect of the rigor. They are, of course, to be guarded against and are combatted by external heat, quiet, induced by an opiate if necessary, and the use of a bed-pan. Rapid elimination, where possible, is of course the best method of preventing these rigors.

That quinine should be given in large doses or not at all is apparently the consensus of opinion, and this certainly works in with the hypothesis which the author has attempted to present. He adds that it should be given early or not at all, and this seems to be even more impor-

tant. When it is given, every effort should be made to prepare the patient for and tide him over the crisis which is bound to follow, and if he can live through this he stands a better chance of complete and rapid recovery than the patient who has had no quinine. The cases for quinine treatment should be very carefully selected, and the question carefully considered whether their resistance, or what is left of it, is strong enough to stand the quinine crisis.

By far the best method of treatment is eliminative. If we will remove the poisonous products of the struggle by means of diuresis, purgation and diaphoresis, of importance in the order named, nature will destroy the invaders and leave the patient enough blood elements to meet his immediate needs and preserve life in a good percentage of cases. The byword of the older practitioners, "keep his kidneys going and he will live," is just as true to-day as it ever was, and in nearly all cases in which the urinary flow can be sufficiently maintained a recovery can be looked for. Of course, this is not meant to refer to inter-current conditions and complications to which the hemoglobinuric fever patient and convalescent is exceedingly prone.

Effect of Quinine on Rabies in Dogs. Of three dogs treated by Moon,[8] two are alive and healthy and one died of some obscure cause two and one-half months after treatment. The control animals in every case died with the characteristic symptoms and pathologic changes of rabies. The dogs were inoculated with rabid brain material and allowed to develop active symptoms of rabies. The technic of inoculation was as follows: A portion of the hippocampus or cerebral cortex of a rabid animal was rubbed into an emulsion with normal salt solution. With a small neeedle a few drops of this emulsion were then injected into and around the ulnar nerve at the elbow or a long, slender needle was inserted in the lower conjunctival sac below the eyeball and extended back until the point entered or passed through the optic foramen. The injection was thus made directly into the optic tract, or subdurally. The latter method

(8) Jour. Infect. Dis., July, 1913.

of course necessitated the employment of general anesthesia, but the results were more uniform than by the other method, and the incubation period shorter.

When active symptoms of rabies developed, as unusual excitability, restlessness, changed quality of the bark, decreased appetite, sometimes difficulty of swallowing, muscular spasms, paralysis of the legs, etc., the dog was given very large doses of quinine sulphate several times daily, while another dog inoculated at the same time and under the same conditions was allowed to go untreated as a control. The quinine was administered in capsules around which was stitched a thin covering of fresh tough meat, as from the flank of beef. The dog would usually bolt these without chewing, but if he became unable to swallow, as happened several times, the same quantity of quinine bisulphate was given in solution hypodermically. The daily amount given a 6 or 7 kilogram dog was from 1.0 to 1.6 gm., usually in three doses. This is equivalent to from 12 to 18 gm. daily for an average man, in proportion to the body weight. The medication was thus pushed to the limit to secure the full physiologic, bordering on toxic, effect. The idea was that in order to test thoroughly the effect of quinine the system should be kept saturated with it. No ill effects followed, and the results seem encouraging.

Untoward Results of Quinine and Urea Hydrochloride as a Local Anesthetic. This important subject is discussed by Earle,[9] who reminds us that since the introduction of quinine and urea hydrochloride as a local anesthetic by Drs. Arthur E. Hertzler, Roger B. Brewster and Ford B. Rogers they have used it extensively in most of their cases in which a local anesthesia was indicated.

When Earle first saw the notice of its use as a local anesthetic, he recalled, to his assistants, his experience with this remedy in 1870, when it was highly recommended by the late Dr. William T. Howard, of Baltimore, in obstinate cases of malaria, especially when the patient was unable to take a sufficiently large amount of quinine by the mouth to control the fever. In every

(9) Interstate Med. Jour., February, 1913.

case in which Earle used it at that time he saw extensive sloughing; and although at present he is unable to recall the strength of the solutions used, he thinks they must have been much stronger than those recommended by Dr. Hertzler and others. Nevertheless, another trial was given the remedy for its local anesthetic effect in the strength they recommended.

In several instances both Dr. Arthur Hebb and the writer found, as Dr. Holtzler had, that when they exceeded a 2 per cent. solution healing was always retarded, but no other bad results followed, such as sloughing, etc.

In April, 1912, Dr. Hebb saw an extensive abscess following the use of a 1 per cent. solution for the removal of internal hemorrhoids. At that time he attributed this bad result to meddlesome interference by a careless nurse. A few weeeks subsquent to this, Earle's assistant at the Hebrew Hospital, Dr. Lewis J. Rosenthal, had two cases of sloughing follow the use of a 2 per cent. solution of quinine and urea hydrochloride in the operation for hemorrhoids. He assured Dr. Earle that he had been very careful and that there had been no defect in technic. In July, 1912, Earle operated on a patient with mixed hemorrhoids, using a 2 per cent. solution of quinine and urea hypodermically as a local anesthetic. The wound seemed to do remarkably well, but on the third day the patient's temperature rose to 103° F., and continued to do so daily for four or five days. Not until the fifth day did the wound show any sign of breaking down: on the fifth day there was a distinct slough, of considerable size, beneath the mucous membrane and above the external sphincter; this was purely necrotic tissue, but not a drop of pus had thus far formed. After a few days the slough broke down and a liquid pus was discharged.

Dr. H. H. Rightor, of Helena, Ark., has reported a similar result following the use of quinine and urea hypodermically in an operation for circumcision. As this was a typical case, Earle thinks it well to submit an extract from it: "The operation was perfectly satisfactory so far as the anesthesia was concerned. On the

day following the operation there was considerable discoloration of a violet hue; this lasted until the fifth day, when the sutures of silk-worm gut were removed. The tissues were still anesthetized; on the seventh day there was a foul odor, and a well-marked localized gangrene, extending to the line of infiltration, entirely around the line of incision; but no suppuration. With tissue forceps this gangrenous mass was lifted out *en masse,* leaving a raw surface."

Quinine in Pneumonia. S. Solis-Cohen[1] employs in this treatment the double chloride of quinine and urea introduced intramuscularly in a 50 per cent. solution; the hypodermic injection of cocaine hydrochloride solution or of an extract of the posterior lobe of the pituitary body for the maintenance of blood pressure; and in cases of prolonged fever, delayed resolution or tardy convalescence, the injection of bacterins. The initial dose of the quinine salt is from 15 to 25 grains followed by fifteen grains every third hour until the temperature falls and stays down below 102.2° F. One-half grain of cocaine hydrochloride or of caffeine sodio-salicylate, or 1 c.c. of pituitary liquid, or 1 c.c. of the 1 to 1000 solution of the posterior pituitary principle is given with the first quinine dose and repeated likewise every third hour until the systolic blood-pressure curve in millimeters of mercury taken in the arm rises and remains above the curve representing pulse frequency in beats per minute. No invariable maximum limit has been fixed to the number of injections of quinine or pressor substances, but it has beeen considered best to continue them not beyond the first twenty-four hours and rarely so long as this. When the desired effects have not been reached by that time, the interval between injections has been increased to six hours. In general the idea is to give as much quinine as can be borne in the first 48 hours and as little of the pressor drugs as is needed to maintain the systolic blood pressure a safe distance from the pulse rate. These directions apply to moderately strong adults with good results. Until recently, this treatment was reserved for cases calling for active intervention and other patients

(1) Jour. Amer. Med. Ass'n., July 12, 1913.

were permitted to go without it. Statistics are based, therefore, on cases from the moderately severe to those of the very worst type. At present the author gives the first dose of quinine to every patient and the result has been that the cases have become so much milder that they require no further treatment beyond good nursing. As regards the duration of this treatment, the quinine is seldom continued beyond seventy-two hours and the number of injections ranges from one to fifteen and is ordinarily five or six, usually of about one gram each. The number of cocaine and pituitary injections ranges from one to twenty and will average three and four in each case, and each case must be judged by itself. The only general rule is to give enough to produce the desired effect and no more.

RADIOTHERAPY.

Radium.

Therapeutics of Radium. The first report of Mr. Hayward Pinch,[2] the medical superintendent of the Radium Institute, founded in London in 1911 at the suggestion of King Edward VII, and through the munificence of Sir Ernest Cassel and Viscount Iveagh, is an interesting and in many ways a remarkable document, for the opportunity of publishing which the *British Medical Journal* is indebted to Sir Frederick Treves, chairman of the Executive Committee of the Institute. It is remarkable, too, for the temperate spirit and scientific caution with which it is drawn up, and it is remarkable also for the striking benefit derived by certain patients in a distressing and hopeless condition from the treatment provided by the institute. Too often those who have been concerned in the earliest application of a new method of treatment producing effects patent to any observer have been carried off their feet, and in the first flush of enthusiasm, generalizing from insufficient data, have made promises which later experience has not fulfilled. The report now published is free from that defect, and Mr. Pinch takes occasion to utter a warning

(2) Brit. Med. Jour., Jan. 25, 1913.

against the irrational enthusiasm and unthinking expectation which has often attended the introduction of a new remedy and so led to cruel disappointment. He gives a rigid interpretation to the term "apparent cure," which is understood to be a condition in which all trace of the original lesion or lesions has disappeared, in which there is no sign of any recurrence, and in which the patient is, so far as can be determined by a thorough and careful examination, free from any indication or symptom of the disease.

The report deals with the work of the institute, since it was opened in August, 1911, down to the end of last year, a period of a little over sixteen months. Owing to the generosity of its founders, the institute is in possession of a very large stock of radium, so that practically any quantity considered advisable can be used in the treatment of any case; but Mr. Pinch makes it clear that great discretion must be exercised in determining the amount which shall be used, the duration of application, and the amount of screening in any given case. All patients applying to the institute have been received, except those practically moribund or those in whom the disease was of a kind for which radium-therapy was manifestly unsuitable.

Probably most readers will look first at those passages in the report which deal with cancer. Any attempt to form an opinion with regard to them must be governed by the statement in the opening sentences of the report that no examples of malignant disease, with the single exception of rodent ulcer, have been treated unless operation has been declared to be unjustified or the patient has absolutely refused operation; the rigid interpretation given to the term "apparent cure" must also be noted. No useful purpose would be served by a minute analysis of the statistics, and Mr. Pinch does not attempt it. The stages and extent of the disease vary so much from case to case that only a very large number would warrant use of the statistical method, but some general impression may be obtained from a summary view of certain classes. It appears that the total number of patients suffering from epithelioma who applied for

treatment at the institute was 147; of these, 13 were not treated; in 8 the treatment was commenced so recently that no opinion on its results can be stated; and in 15 the application of radium was prophylactic only. This leaves 111 cases in which the treatment of epithelioma was undertaken, although it was abandoned by 23 patients. Of the 88 cases that remain if these be deducted, 20 patients are not improved and 22 are dead; if to them, on the assumption that the abandonment was due to the patients' disappointment with the result, we add the cases in which the treatment was abandoned, we get a total of 65 failures, or nearly three-fifths. To set off, we have 7 cases in which the patient was apparently cured and 39 in which there was improvement—a total of 46, or about two-fifths. Applying the same system of classification we find that in cancer of the breast the treatment failed in 38 cases and was attended with more or less success in 35, and that in cancer of the rectum it failed in 27 cases, or about three-fourths, and succeeded in 10, or rather over one-fourth. The report is quite definite in advising that radium should never be used in cancer of the breast as a substitute for operation, and the same is true of cancer of the rectum. It seems established, however, that in inoperable cases of cancer of the breast, radium is often able to relieve pain, promote the healing of ulcers, and check the growth of secondary deposits; in a few instances superficial carcinomatous nodules and enlarged glands disappeared, and reports are given of several such cases in which the results were very remarkable.

In cancer of the uterus the immediate results reported are so satisfactory that it would appear well worth while to submit any patient with inoperable disease to the radium treatment. It has been applied by introducing into the cervical canal a tube containing radium for periods of from 30 to 60 hours spread over from 5 to 10 days. In a considerable proportion of cases hemorrhage is arrested, discharge diminished and rendered inoffensive, ulceration healed, pain relieved, and the growth even in some cases stopped. Out of 39 patients treated 3 were apparently cured, while 19 were improved; but

the report points out that the action is only local, that in most cases dissemination will occur, and the growth spread to parts beyond the effective range of radium.

The evidence as to rodent ulcer seems to justify the conclusion that the best advice which can be given to a patient with rodent ulcer of the skin is to resort at once to treatment by radium. It has been found that if the lesion has been treated for prolonged periods by the X-rays, zinc ionization, and carbonic acid snow, the healed tissue frequently breaks down after radium, and repair is slow and imperfect. A small rodent ulcer limited to the skin and not previously treated may be cured by a single exposure, probably because it is safe to use a full-strength applicator unscreened. With a large ulcer it is necessary to proceed more cautiously, as an unscreened application to the whole area will produce systemic disturbance. Different parts of the surface are therefore treated at intervals of three or four weeks. If the disease has attacked bone or cartilage, still more caution is requisite to avoid the risk of acute painful and prolonged inflammation. Rodent ulcer of a mucous membrane is refractory to treatment by radium, though small lesions of the palpebral mucous membrane often respond well to a strong unscreened application. The statistics are encouraging. Omitting one case in which the application was prophylactic only and 10 treated so recently that the result cannot be stated, there remain 90 cases. Of these, 12 patients were not improved, 6 abandoned treatment, 31 were apparently cured, and 41 improved. If we assume that treatment was abandoned owing to its want of success, it will be seen that the treatment failed in one-fifth of the cases, succeeded in about one-third, and produced improvement in the remainder. It will be noted that all the patients who applied to the institute were treated. The cases of sarcoma were relatively few; 26 patients were treated, of whom 9, or about one-third, were improved, it being said of 2 of them that they are apparently cured.

Among the other diseases treated the most striking results were obtained in keloid and nevus. In the former disorder they are described as "admirable," and

whether judged by the statistics or by the individual cases narrated the epithet seems to involve no exaggeration.

Of the 14 cases of keloid, or keloid acne, treated, 3 individuals are reported cured and 8 improved, while the treatment was abandoned in the remaining 3. One of the chief practical difficulties in the therapeutic application of radium is so to adjust the strength and duration of the application as to avoid a severe reaction. The cause and nature of the reaction has not yet been fully elucidated. Why it should commonly be delayed for two, three, or even four weeks, is not at all clear, and we are not aware that any explanation has been suggested. In some cases in which an eroded surface exists the radium reaction proper is, there can be little doubt, complicated and aggravated by septic infection, and it would seem that in some such cases the severe pain suffered during the reaction is in part, at least, due to this cause.

They are indebted to Prof. E. Rutherford, F.R.S., of Manchester, for the information that in his laboratory a number of cases have occurred in which fingers have been burnt by exposure to the alpha rays. This has usually occurred in transference of the emanation or in fixing an alpha ray tube in an apparatus when the fingers were brought into close contact with the tube. As a rule nothing is noticed at the time, but a week or ten days later the finger becomes very painful, and a slight bluish tinge is observed under the skin. The general effect later is that the finger has lost to a great extent its sensitiveness of touch, but there have been no cases of sores which would not heal. These particulars are an interesting addition to the information given in his "Radioactive Substances and Their Radiation," a book to which are referred all serious students of the subject.

The treatment at present is in the empirical stage. To get an institution of this novel kind into working order and to evolve the test rules for its administration has been no easy task. Now that it has been accomplished we may look forward to the prosecution of inquiries into the physiological action of radium, for on the perfecting

of knowledge on this side the establishment of principles governing the scientific use of the radiations in therapeutics must depend. A question of vital importance is to ascertain whether the rays of radium exert a specific action on cancerous or developing tissue. At present it is not clear which rays produce the effects observed in carcinoma. So far as can be judged it is improbable that the alpha rays, under the conditions described, can as a rule have reached the tissues. Whether the most penetrating rays—the gamma rays—have any physiologic effect is not known with any certainty, but the evidence seems, on the whole, against such a hypothesis. There remain, therefore, the beta rays, which are themselves complex. An analytic study of the physiologic effects of the several groups of rays would be a worthy object for the Radium Institute with its unrivaled resources and magnificent opportunities.

Radium in Treatment of Nevi. Complete eradication of vascular nevi, without any scarring whatever, is claimed for radium by Foveau de Courmelles.[3] He advises that the skin be first broken over the lesion, even if it be only by the lightest application of electrolysis, as this permits of a more rapid action of the radium salt, and its use in relatively small dosage. Since the vascularization in these blemishes varies, and is not the same in different portions of the same lesion, he applies radium varnishes or radium salts in tubes corresponding in strength with the redness of the regions treated. Burns and scars otherwise possible are thus avoided.

Radium in Malignant Disease. R. Knox[4] concludes that in all cases of early cancer the operative method is undoubtedly the best; it is quicker and safer, and offers the best prospect of cure. Radium is a useful adjunct to the treatment of all cases, first as a prophylactic after operation, and, failing operation, the next best method one possesses. It must, however, be stated that in selected cases *x*-rays are quite as useful as radium. In patients who refuse operation, radium is a useful remedy. In inoperable cases radium may help to render the

(3) Jour. d'hyg., Sept. 25, 1912.
(4) Brit. Med. Jour., June 7, 1913.

case operable; and, failing that, is undoubtedly useful as a palliative measure.

ROENTGEN RAYS.

Treatment of Exophthalmic Goiter by Roentgen Exposures of the Ovaries. Mannaberg[5] is convinced that the ovaries play some part in the clinical picture of exophthalmic goiter. This may be from some substance formed in the ovaries which acts on the thyroid and modifies its functioning in such a way that the exophthalmic goiter is the result. By the exposures to the Roentgen rays the source of this substance in the ovaries is dried up and the thyroid is permitted to resume its normal functioning. In the ten cases in which he has applied this measure a favorable influence was manifest on all the symptoms except the goiter. He does not call it a cure in any case as the pulse is still unstable. It is possible that a course of thyroid treatment might advantageously supplement the radiotherapy. In eight of the ten cases the patients gained from 2.3 to 21 per cent. in weight. In one case the exophthalmos completely subsided; in half of the cases more or less improvement in this was evident, and in the others there was no change. The most striking improvement was subjective; nearly all the patients now feel entirely well and have regained their full earning capacity. They were women from 21 to 42 years old, and from three to fifteen exposures were given. His impression on the whole is that this method of treatment is more reliable than any other to date in the not too far advanced cases, and leads to improvement more rapidly.

X-Ray Treatment of Epithelioma. G. M. Mackee and J. Remer[6] state that the advantages of the massive dose over the fractional dose method in the treatment of cutaneous epithelioma are the following: (1) The accurate measurement of the dose is hardly ever attempted except in intensive treatment, so that the method can be said to be accurate and scientific. (2) The patient is spared the necessity of almost unlimited visits to the

(5) Wien. klin. Wochenschr., May 1, 1913.
(6) New York Med. Jour., March 29, 1913.

physician's office. It has been proved that prolonged and excessive exposure to the *x*-rays can produce cancer. It would seem advisable, therefore, in the treatment of epithelioma with the *x*-rays, to give as nearly as possible the exact or minimal amount necessary in the individual case. This dose may be divided into several strong treatments, but not into limited and oft-repeated mild exposures. The only way to cure a cutaneous epithelioma with the minimum amount of ray is to obtain the desired result in one treatment. If, for instance, six H units of a No. 6 or 7 Benoist ray, administered at one sitting, will effect a cure in a given case, the same effect will not be noted if this dose is divided into more than one treatment.

Radiotherapy in Gynecology. Hamm[7] remarks that not even the brilliant successes of surgery have rid the public of the universal dread of operations, and consequently the new era of intensive and filtered dosage of the Roentgen rays seems to open new fields, especially in gynecology. It is asserted from Freiburg (Gauss) that with the new technic it is possible to cure every patient with a myoma in five weeks, regardless of the woman's age or the size of the myoma. Kronig affirms that sarcomas retrogress under the rays even more quickly than myomas. The improvements in the technic consist mainly in the exclusive use of hard rays, filtered through a sheet of aluminum 3 mm. thick, the tube only 20 cm. distant, and the rays sent from as many different points as possible on the "cross-fire principle." There has been no ray burn since this technic has been applied. Gauss' experiments with plant seedlings have confirmed the far greater destructive action of the hard rays on the tissues. The only by-effects he has observed with the new technic are the occasional "*Roentgenkater*," headache and nausea, persisting for from one to four days after the exposure. Hamm rejects radiotherapy for all gynecologic affections except myomas and hemorrhagic uterine disease. And with these he advocates operative measures by preference if it is possible with enucleation to retain the genital function of the uterus, or if

(7) Therap. Monats., July, 1913.

the myoma is pedunculated and projects from the cervic, or there is suspicion of gangrene or of a mucosa carcinoma or of sarcomatous degeneration of the myoma—suggested by its rapid growth, hemorrhages and the lack of prompt influence from the Roentgen rays; and also if the myoma has entailed acute incarceration of the bladder. Hamm tabulates the outcome with radiotherapy, as reported from five large clinics, the successes ranging from 63 to 76.3 per cent., but the Freiburg clinic reports 21 cases of hemorrhage with 100 per cent. cures, and 79 cases of myoma with 100 per cent. cures since the new technic has been applied. Kraurosis vulvæ yielded in one of Hamm's cases to treatment with ovarian extract. It has been proposed as a harmless method of interrupting the pregnancy in a tuberculous woman. Gauss makes such patients sign a certificate that in case the attempt fails they will apply to a physician for an instrumental abortion, as otherwise they might sue him for damages in case a deformed child should be born.

Efficacy of Radiotherapy in Gynecology, Especially for Carcinoma of the Uterus. Döderlein[8] uses the technic advocated by Kronig, Gauss and Limbecke and to it attributes a great measure of his success. He reports thirty-two cases of myoma and hemorrhage with prompt and permanent benefit under radiotherapy and without any bad effects. The tumors entirely disappeared in many cases. More surprising still, he found a combination of Roentgen ray and mesothorium treatment effective in many cases of uterine cancer. Six cases are described and reproductions given of the microscopic picture before and after treatment. He thinks the rays have a direct effect on the carcinoma cells and not, as has been previously held, that the cancer cells are affected secondarily by contraction of the surrounding connective tissue. He also reports eight cases of unsuccessful treatment in cancers which had returned after operation.

Roentgenotherapy of Inoperable Cancers. Finsterer[9] applies an extremely radical technic for exposing an inoperable cancer in the stomach to the Roentgen rays

(8) Monats. f. Geburts. u. Gynäk., May, 1913.
(9) Münch. med. Wochenschr., April 22, 1913.

and reports excellent results. After the median laparotomy under local anesthesia, he makes a gastro-enterostomy as far to the left as possible, and then cuts both rectus muscles across, two or three finger-breadths above the umbilicus, carrying the incision down to the costal arch and thus making a wide opening in the abdomen which leaves the stomach, its omentum and the gastrocolic ligament amply exposed. He packs around them with gauze to induce formation of adhesions. Five or six days are generally enough for this. No tendency to peritonitis or prolapse developed in the seven cases in which he has applied this technic. Under local anesthesia resection may be possible in conditions which forbid general anesthesia. Roentgenotherapy may be usefully applied after resection with or without extensive exposure for the purpose. In inoperable cases this radical exposure should be done as a routine measure in place of an exploratory laparotomy, and the gastro-enterostomy should follow, made as far toward the fundus as possible, regardless of the permeability of the pylorus. If this technic is not applicable, jejunostomy should be done. This method of radical exposure permits successful treatment of even immovable carcinoma in the posterior wall of the stomach. To prevent a fistula, anything liable to injure the serosa of the stomach, suture, or exploratory excision should be scrupulously avoided and the dosage of the rays should be mild, not over one or two H units. The Roentgen exposures should be kept up a long time, and possibly they may be effectually supplemented by chemical treatment.

Radiotherapy of Cancer. Kronig and Gauss[1] describe their technic—the Freiburg method, as it is called—and the results in 146 cancer cases. The main points of difference from the old technic are the use of the pure gamma rays, carefully filtered through aluminum 3 mm. thick; great increase of the dosage to obtain summation of relatively small single deep doses by the cross-fire method, the tube not over 20 cm. distant; determination of the optimal time limit, and certain precautionary measures to ward off local injury. As the method has

(1) Deutsche med. Wochenschr., June 26, 1913.

only recently been worked out, the longest period of freedom from recurrence to date is sixteen months. They cómpare the primary operative mortality and the absolute success as reported from a number of large clinics with cancer in fourteen different localizations, the composite figure showing that the outcome of surgical measures in some of them is far from encouraging, even at the best. With cancer of the breast, for instance, the operative mortality is 4 per cent., the absolute cures only 18 per cent.; with cancer of the vagina, the operative mortality is 30 per cent.. absolute cures 4 per cent. On these figures they base their advice to apply radiotherapy even when the cancer can be readily excised. This is not a loss of precious time, as was formerly maintained; it has frequently rendered inoperable cancer operable, and it is logical to assume that conditions in the operable cases will be improved in proportion. They make a practice of applying the radiotherapy by their new intensive dosage technic for from one to three weeks to cancers accessible to sight and touch; if this does not succeed in curing the cancer, the operation can follow at once and is still early enough. If the cancer is operable but not accessible to inspection by touch and sight, the radical operation can be done at once if the statistics show that in the location in question cancer offers a favorable percentage of cures. If this is not the case, radiotherapy may be applied even then. If the cancer is inoperable, the intensive radiotherapy should be applied without delay, supplemented by other methods of treatment. After the operation they insist that in every case there should be systematic prophylactic radiotherapy. This alone seems to ward off recurrence, especially in cases in which the cancer has healed under the exposures alone. Unless this is done systematically as a routine procedure, radiotherapy is liable to be followed by the same disappointing results as are recorded for surgical measures.

Roentgen Rays in Fibroids. E. Falk[2] concludes an interesting article as follows: 1. Fibroids which have reached a considerable size but caused no bleeding or

(2) Berlin klin. Wochenschr., April 29, 1912.

other disturbance do not require any treatment, provided the patient is constantly under supervision. 2. Rapidly growing fibroids are not suitable for treatment with the Roentgen rays, but should be operated, even if a heart lesion is present. 3. Submucous fibroids are not suitable for *x*-ray treatment. 4. In young women, fibroids causing severe bleeding should preferably be operated on, since treatment with the Roentgen rays is apt to affect the ovaries, while after an operation the ovaries will be retained. 5. If adnexal disease is also present, the Roentgen rays may cause an exacerbation of the inflammation. 6. Cases most suitable for treatment other than operative are interstitial fibroids in women over 50 years of age, provided there is no urgent indication for their removal. That the Roentgen rays have a very decided elective effect upon the fibromuscular tissues of these tumors is claimed by E. Graefenberg.

X-Ray Treatment of Uterine Fibroids, Menorrhagia, and Metrorrhagia. The results obtained in the treatment of 52 cases are given by Stern.[3] Although it is by no means a cure-all, he believes that a large proportion of cases can be cured, and others benefited, by the treatment, but there are cases in which it will fail, despite careful and energetic persistence. Sometimes the improvement does not begin till the fourth, or even the fifth, month. There seems to be no danger of producing a permanent menopause in women who are not near the climacteric period. In younger women temporary menopause, lasting in some cases more than eight months, has been followed by a re-establishment of menstruation, generally in a normal manner.

X-Ray Treatment of the Nerve Roots in Neuralgias. A. Zimmern, P. Cottenot, and A. Dariaux[4] report that the application of the Roentgen rays to the nerve roots has yielded constantly good results in the treatment of sciatica, as well as of neuralgia and neuritis of the brachial plexus and trigeminal nerve. Their clinical material consists of thirty cases. Not only was radicular radiotherapy found to exert a pronounced analgesic

(3) Amer. Jour. Obst. and Dis. of Women and Child., June, 1913.
(4) Presse Méd., June 25, 1913.

action, but there was a reparative action, shown in the return of reflexes such as the tricipital or the Achilles reflex. The authors are convinced that whether the condition responsible for the neuralgia be a true radiculitis or a lesion compressing the nerve roots, *x*-ray treatment frees the latter from the surrounding pressure. When the neuralgia is due to involvement of the nerve trunk peripheral to the radicular region, the *x*-rays fail. The dose of the rays given by the authors at each sitting varied from one-half to three H units, according to the sensitiveness of the patients. The apparatus was so disposed as to bring about oblique penetration of the rays to the spinal roots, between or through the vertebral laminæ; the opposite side, beyond the spinous processes, being protected by sheet lead. In sciatica the irradiation should be directed to the last two lumbar and first three sacral vertebræ; the sacro-iliac joint may also be treated. If the cause of the sciatica is suspected to be a true radiculitis, the entire region should be treated, up to the spinous process of the eleventh dorsal vertebra. For brachial neuralgia, the rays should be applied between the third cervical and first dorsal spinous processes, while for trigeminal neuralgia they should reach the region above the zygoma, in the vicinity of the ascending process of the malar bone.

New Unit of Roentgen-Ray Power. The proposed new unit to which Tousey[5] has given his name—the Tousey unit—is the *x*-radiance which produces on an ordinary photographic film an effect equal to that of 1 candle-power of incandescent electric light. With *x*-radiance of medium penetration this gives a guide to accurate therapeutic dosage and correct exposure in radiography. Twenty Housey-meter-seconds of No. 7 Benoist is equal to one Holzknecht unit. The measuring film is prepared in the following manner: A piece of film, 2½ by 3½ inches, is placed in a black envelope in which there are two covered apertures. Each of these is uncovered separately, and each aperture is exposed to 1/10 candle-power-meter-second of incandescent electric light. In the author's laboratory this has to be done

(5) Arch. of Roentgen-Ray, April, 1913.

at night with a 4 candle-power light at a distance of 14 meters for five seconds. A number of these films are prepared beforehand and kept in their black envelopes in readiness for making a test. For this purpose the four corners of the film are given four different exposures to the Roentgen rays measured in meter-seconds, the rest of the film being covered by a lead shield. The entire film is developed at the same time and in the same solutions, thus avoiding the difficulties of standard developers and variations of temperature. The development should last ten minutes in a strong developer, so as to be sure to develop the entire thickness of the film. Stopping the development shortly after the appearance of the image gives an entirely misleading ratio between Roentgen-ray and electric-light sensitiveness. The intensity of the Roentgen-ray light is determined by comparing the dark patches on the film. For example, two meter-seconds (two seconds at 1 meter, or eight seconds at 2 meters, or half a second at ½ meter) of Roentgen radiance has the same photographic effect as 1/10 meter-second of electric light. The Roentgen-ray effect is evidently twenty times weaker, and the Roentgen-ray power on the focus-tube is said to be 1/20 Tousey.

RESORCIN.

Idosyncrasy to Resorcin. W. W. Montgomery,[6] of San Francisco, reports a case of peculiar idiosyncrasy to resorcin in a patient who consulted him on account of a severe dermatitis of the scalp and forehead following the use of a dandruff cure. The resorcin paste of moderate strength, 3.25 per cent., was given and caused a violent reaction. When diluted one-half it still produced the symptom. The patient recognized from the symptoms that the same lotion must have been present in the barber's lotion employed. Later he had a similar attack from the use of an ointment given him by his sister. Inquiry as to any sensitiveness as to drugs elicited the fact that his parents were first cousins, which is interesting on account of a full-blooded brother and

(6) Jour. Amer. Med. Ass'n., June 28, 1913.

sister being also sensitive to the same drug. Montgomery describes the action of resorcin and notices the previous instances of resorcin poisoning that have been reported. He says: "In summing up we may say that resorcin when applied in full strength on the skin acts as a highly irritant caustic. It is a powerful antiseptic and, when applied as a strong lotion or ointment, causes an active desquamation of the upper epithelial layers. It is therefore an efficient cutaneous antiseptic, both because it kills the bacteria and because it produces an exfoliation of the bed in which they lie. Besides being a caustic, an irritant and antiseptic, it has a eu-epithelial action common to it and the tars and coal tars, so that when properly diluted it lessens cutaneous irritation, and favors the return of epithelial cells to normal physiologic functions. When applied in strong dosage over large surfaces, especially if these surfaces are denuded, it may be absorbed and cause dangerous symptoms of internal poisoning, or even coma or death."

SALICYLIC ACID.

Salicylic Acid and Allied Bodies in Rheumatism. R. Stockman[7] finds that the real efficiency of the numerous compounds which have been recommended in rheumatic affections depends solely on the amount of salicylic acid which they contain or develop in the body. Little is known as to how chemical constitution influences the anti-rheumatic action of this group of substances. Benzoic acid, formed by the introduction of COOH into benzol, shows this specific action, but when two molecules of COOH are introduced (phthalic acid) the anti-rheumatic effect is diminished almost to the vanishing point. When, however, OH is introduced into benzoic acid to form salicylic acid, the efficacy is enormously increased, and it looks as if this OH were the determining factor, yet the stereo-isomers of salicylic acid, m-oxybenzoic and p-oxybenzoic acids, have no action. When the OH of salicylic acid is altered into OCH_3, as in ortho-methoxybenzoic acid, all anti-rheumatic effect disappears. That the COOH molecule also has a domi-

(7) Brit. Med. Jour., March 22, 1913.

nating influence is shown by the fact that in cinnamic and coumaric acids, where it is disturbed, the specific anti-rheumatic action is completely lost. Methyl salicylate develops salicylic acid in the body and retains the specific action, while the dimethyl-salicylic acid, which does not do so, is inert, and the same holds true in the case of other salicylic compounds, such as salicin (which is active) and populin (which is inactive). The cresotinic acids are the only substances which are known to equal or even approach salicylic acid in efficiency. The prevention of heart lesions, valvular and myocardial, should be the great aim of one's treatment, yet it is notorious that heart lesions occur very commonly even while large doses of salicylates are being administered. It is still an open question whether these lesions and rheumatic lesions generally are caused by colonies of microbes or by toxins; nor is it known definitely whether the salicylates act as antimicrobes or as antitoxins. The most immediate explanation of their action is that they kill or injure a casual microbe, but it has also been maintained that the almost instantaneous although transient effect of a small dose given intravenously points to an antitoxin action, and that when given by mouth the rapid abatement of symptoms apart from the real cure, as shown by the tendency to relapse, points in the same direction. It is not seriously held at the present day that any of the germicidal remedies can be given in sufficient amount to kill bacteria in the human body. The most one can hope for is that their vital activity and capacity to produce toxins may be abated, and that thereby the natural defensive agencies of the body will be enabled to deal with them more readily and effectively so that the infection is got rid of. Most probably this is what occurs in rheumatic fever under salicylic treatment, and it explains the tendency to relapse if the remedy be prematurely stopped or not given in sufficiently large doses.

Salicylates in Chorea. The *Therapeutic Gazette* calls attention to the reports made by numerous physicians to various journals and medical societies of the good results which have followed the use of full doses of the

salicylates in controlling and finally curing the choreic symptoms. Notably amongst these contributions have been those of Sharp, Poynton and Ness and Lees. The latter, who is well known for his advocacy of enormous doses of salicylates in rheumatism, also advocates their use in this disease. Allan, a Scotch physician, has come to rely largely on acetyl-salicylic acid and apparently substitutes it entirely for arsenic.

Fromm[8] goes over the literature of this subject and reports nine cases. His experience is interesting. He thinks that all treatment in the way of drugs is futile unless rest is insisted on. His first case began with a severe arthritic attack, and the patient was treated first by sodium salicylate in doses of 10 grains every three hours, apparently without very marked improvement. Aspirin was then substituted, 10 grains being given every three hours. He states that within thirty days all the choreiform movements had disappeared. It would appear, therefore, that the remedy is not a very prompt one in its effect, and it is noteworthy that 80 grains a day of aspirin to a child of 16 years is a dose which is large enough to produce, in some persons at least, very disagreeable symptoms. In still another case which was ushered in with rheumatic arthritis 5 grains of aspirin were given every three hours in association with moderate doses of the syrup of iodide of iron. In this instance marked improvement appeared about the tenth day, and by the end of three weeks all choreiform movements had disappeared. This child was 9 years of age. In the fourth case, a boy of 13, primarily suffering from rheumatic fever, a month later was attacked by chorea. This patient was given 10 grains of sodium salicylate every four hours and instructed to remain in bed from two to three hours each day. But even six weeks after this treatment was instituted there was only "considerable improvement." Later, however, the choreic movements ceased. The facts given in regard to these cases are practically identical with those described in connection with the remaining ones.

Fromm admits that the number of his cases does not

(8) Albany Med. Ann., November, 1912.

justify positive conclusions as to the efficiency of the salicylates in chorea, although in each instance they were rheumatic in type. Nevertheless, he is ready to assert that the salicylates are practically specific in acute rheumatism, and that they are at least useful in the majority of choreic cases; and while chorea is said by many to be a self-limited disease, nevertheless he claims that the salicylates shorten its course materially.

Toxic Dose of Salicylates. The clinical records of 400 patients, extending over a period of about twelve years, were examined by Hanzlik.[9] The mean toxic doses of the different salicylates for males and females, respectively, were found to be as follows: 180 and 140 grains of the synthetic sodium salicylate; 200 and 135 grains of the "natural" sodium salicylate; 120 minims of the methyl salicylate or oil of gaultheria; 165 and 120 grains of acetyl-salicylic acid (aspirin); 100 and 83 grains of salicylo-salicylic acid. The toxic doses of the different salicylates were found to be practically the same in various diseased conditions of both sexes. In all conditions where there were three or more cases, the toxic dose of the synthetic salicylate ranged between 150 and 220 grains for males; between 135 and 160 grains for females. Practically the same is true for the "natural" salicylate and methyl salicylate.

The therapeutic response (or clinical result obtained after a toxic dose) in various diseased conditions does not modify the toxic dose of the synthetic salicylate. The therapeutically effective doses, just as the toxic doses, are somewhat smaller for females than for males. The therapeutic efficiency of the synthetic salicylate is greatest (82 per cent.) in acute rheumatic fever. Subacute rheumatism and other conditions are also relieved, often completely, but the percentage of complete successes is not nearly so great (41 to 53 per cent.) and the percentage of failures much higher (16 to 29 per cent.). In sciatica, no complete relief was obtained, but the majority (about 73 per cent.) of patients showed more or less relief. It was found that in males albumi-

(9) Cleveland Med. Jour., April, 1913.

nuria was much more frequent (about 70 per cent.) in febrile than in afebrile conditions. This suggests strongly that the renal irritation is due to fever, rather than to the salicylate. The effect of repeated dosage in the same individual was studied. It was found that the difference below and above the common range of 100 and 200 grains, respectively, can not be attributed to the influence of age, sex, race and diseased conditions. The idiosyncrasy generally varies in the same person and is not influenced by previous salicylate medications. There was also no demonstrable habituation to the synthetic salicylate.

SALINE INJECTIONS.

Saline Injections in Toxic Skin Diseases of Pregnancy. Rissman[1] states that in September, 1911, he was led to use Ringer's saline solution instead of serum, which was not obtainable at that time, in a severe case of pruritis in a pregnant woman. The improvement which followed an intramuscular injection of 165 c.c. of this solution induced him to repeat the experiment in several other cases, the results being very beneficial. In the case of a woman of 34, who suffered from severe general pruritis toward the close of her first pregnancy, the skin over the abdomen was reddened, thickened, and edematous. Treatment with ointments was unavailing and sleep was disturbed. The intramuscular injection of 160 c.c. of Ringer's solution was followed in a few hours by marked improvement, and a peaceful night was passed. The pruritis improved daily, and it had disappeared four days later when labor began. The recovery was maintained throughout the puerperium.

In another case pruritis involving the arms appeared in a woman of 23, whose first confinement was terminated a day earlier. The pruritis spread in the course of a day to the lower limbs. The forearms and lower limbs were covered with small wheals, and sleep was much disturbed. The itching ceased and sleep returned after an injection of 190 c.c. of Ringer's solution.

Another pregnant woman had been treated in vain

(1) Deutsch. med. Wochenschr., June 3, 1912.

during the latter months of her first pregnancy for intolerable itching, which had evidently at first been mistaken for scabies. Abrasion due to scratching covered the whole body. An injection of 175 c.c. of Ringer's solution was followed by the first peaceful night which the patient had spent for several weeks. On the following day the itching had almost ceased, but as it still caused some discomfort four days later, a second injection was given, after which an uneventful recovery was made.

The injections were supplemented by no other forms of treatment, and as no ill effects ensued, even when out-patients were thus treated, Rissman advocated their adoption in general practice. In severe cases it is necessary to repeat the injections, and care should be taken to exclude such cases as are the results of parasites of the skin. The operation is simple, and only requires a funnel, tubing, and a hollow needle. It is therefore much simpler than the procedure devised by Bruck, who has obtained good results in cases of universal and senile pruritis, urticaria papulosa, and erythema exudativum multiforme by venesection, followed by the intravenous injection of saline solution.

The author attributes the beneficial results obtained by his method to the dilution of toxins circulating in the blood and to the increased diuresis which follows the injections. The nature of toxins causing cutaneous eruptions in pregnancy is still obscure, and it is uncertain whether they are due to products of faulty metabolism or to microbes flourishing in the tissues. The author suggests that the injection may also affect the composition of the blood by stimulating the blood-forming organs.

SALVARSAN AND NEOSALVARSAN.

Absorption of Arsenic Following Intramuscular Injections of Salvarsan and Neosalvarsan. Swift[2] reaches these results:

Intramuscular injection of salvarsan and neosalvarsan in rabbits always produces necrosis of the muscles. A

(2) Jour. Exper. Med., January, 1913.

much more intense reaction is produced by salvarsan than by neosalvarsan.

The rate of absorption of arsenic following intramuscular injections of salvarsan is very slow, while following intramuscular injections of neosalvarsan between 75 and 85 per cent. of the arsenic is absorbed during the first week. The subsequent absorption is quite slow.

Manner of Giving Salvarsan. The apparatus used by Arnold[3] is simple in the extreme. A large, heavy glass bulb-funnel, of about 500 c.c. capacity, without stopcock or stopper, is used as the receptacle. About four feet of small tubing is connected to this, with a pinchcock and a large aspirating needle fitted to the distal end. A stoppered graduated cylinder of 50 c.c. capacity and a pipette of 2 c.c. capacity are also required. For the preparation of the solution of the drug, only one reagent is needed, a 15 per cent. solution of sodium hydroxide in distilled water. No sodium chloride or hydroxide except the C. P. should ever be employed. The sterilization of the apparatus must be carried out by boiling in distilled water. The water used in making up the solution should be freshly distilled. Arnold uses a simple combination of a Jena distilling flask and a Liebig condenser for this purpose.

The patient's arm is scrubbed from shoulder to wrist and a bichloride pack applied and allowed to remain in place for at least half an hour. In case an incision is to be employed, it is well for the beginner not to make up the solution until the incision has been made and the vein laid bare; the apparatus should be boiling while the vein is being exposed.

The apparatus having been boiled for fifteen minutes in a covered dish with enough distilled water to cover the articles, the distilled water and sodium chloride solutions are put on to boil. These are conveniently contained in Erlenmeyer flasks of about 500 c.c. capacity, with gauze stoppers. The saline solution is made up by adding 7.5 gm. of C. P. sodium chloride to 1 liter of freshly distilled water.

(3) Jour. Mich. State Med. Soc., April, 1913.

About 20 or 30 c.c. of the hot sterile water is poured into the graduate, and the drug added to this. If the entire dose of 0.6 gm. is not to be given, the reduction can most easily be made by discarding a proper proportion of the solution. The stopper is placed in the graduate and the latter shaken until a perfectly clear solution results. The writer does not use glass beads.

Two cubic centimeters of the sodium hydroxide solution are now added from the pipette, and the graduate shaken again. A voluminous precipitate results. More alkali solution is added drop by drop, with frequent shaking, until the solution again becomes clear. The approach of the point where clearing occurs is indicated by a darkening of the liquid. An absolutely clear solution, with not even a trace of opalescence, should be had. Keeping the solutions hot will aid in obtaining and maintaining this effect.

About 350 c.c. of the hot sterile salt solution is next poured into the bulb-funnel and allowed to run rapidly through the tube and needle for a few seconds, to be sure that all air is removed from the tube. It is even well to strip the tube through the fingers, to be sure that no air-bubbles remain.

The needle is then introduced into the vein, in the direction of the blood-current. The salt solution should be flowing constantly during this procedure, to prevent the access of air to the needle-end.

When it is seen that the salt solution is flowing satisfactorily, the salvarsan solution is carefully poured into the bulb. About fifteen minutes should be allowed for the 300 c.c. to run in. When the bulb is almost emptied, 50 or 75 c.c. of saline should be added, to wash out the tube and vein. Unless the solution was almost boiling when placed in the bulb, it will be cooled down to 100° F. or so when it reaches the needle. The temperature may be estimated closely enough by feeling the tube and needle.

When the last added saline has run through the tube for a time, the needle is withdrawn and a compress instantly placed over the opening, and held there with moderate pressure for a few minutes. If the skin has

been punctured, the opening is sealed with collodion; or if an incision has been made, it is sewed up with horsehair sutures and a dry, sterile dressing applied. The patient should be kept in bed during the entire procedure, and it is Arnold's practice to keep him there for twenty-four hours afterward.

Oily Injections of Salvarsan. Fifty-eight oily injections were given by Hazen[4] to 44 individuals; 52 were of salvarsan and 6 of neosalvarsan. In general the effects on the lesions and on the Wassermann reaction were excellent; 20 of the injections were practically painless, and only 12 caused pain that was at all severe. Two patients, however, developed slight abscesses of no particular import; one patient developed peripheral phlebitis about two weeks later, and the most serious accident was pulmonary embolism, the patient fortunately recovering in about two weeks.

In 6 instances, abscesses at the site of injection developed in from 3 to 24 months after treatment. In one of these patients both buttocks broke down about 3 months after injection, although the injection was unilateral. In one case, exactly 2 years after the administration of salvarsan, an abscess pointed in the buttock. It was opened, and about 6 ounces of sterile pus and considerable tissue débris were evacuated. In another case 5 small injections were given at bi-weekly intervals without any especial trouble, but about 3 months after the last both buttocks became red, swollen, and painful, with distinct fluctuation. One other patient has had permanent nodules left in his buttocks, and complains bitterly of pains radiating down both sciatic nerves.

The material injected is evidently toxic to tissue at the site of injection, and this dead tissue, if not absorbed, may act as a foreign body. In the abscesses opened no trace of salvarsan could be found.

After the use of neosalvarsan in water one must be prepared for severe pain. Hazen has seen 1 patient rendered absolutely helpless for three weeks. Nor does the administration of neosalvarsan in glycerine work any better. Oily injections of neosalvarsan are more

(4) Jour. Amer. Med. Ass'n., May 24, 1913.

painful than when salvarsan is used. Out of 6 injections 3 patients experienced great discomfort. The intravenous method should be the only one employed.

Salvarsan in Pernicious Anemia. Hobhouse[5] says that the blood reports speak more eloquently than any words, and concludes with the following remarks:

1. The rapid fall of temperature after the first injection suggests strongly the destruction of some virus.

2. In another case he would postpone the second injection as long as improvement was going on, for a week or two.

3. It is difficult to say to what the severe reaction after the second injection was due, possibly hypersensitization. Hobhouse has come across pleurisy in another case after salvarsan.

4. It remains to be seen, he thinks, whether intravenous is equal to intramuscular injection where prolonged action is desirable, though the latter has undoubted advantages.

Salvarsan in Cerebrospinal Syphilis. Excellent results were obtained with salvarsan by J. Donath[6] in the various syphilitic affections of the central nervous system. Thus, in lues cerebri there is improvement or disappearance of facial paralysis, and the paralysis of luetic hemiplegia (in 66 per cent. of the cases). The contractures disappear and the convulsions are soon checked. Writing and muscular power soon approach normal, and pain and paresthesia are alleviated. In 10 cases the psychic condition became normal, and in two there was considerable improvement. In cerebrospinal lues, the gait was restored in 25 per cent. and there was decided improvement in the bladder and sexual functions. The general condition was usually influenced to a marked degree. In the initial stages of tabes, the patellar reflexes may return and the ataxia, Romberg's symptom, gastric crises, lancinating pains and other pains may disappear entirely. In dementia paralytica, in the beginning stages, the pupillary reaction

(5) Brit. Med. Jour., Dec. 14, 1912.
(6) Münch. med. Wochenschr., Oct. 22, 1912.

returned in 3 out of 28 cases and the tendon reflexes in one case. In 4 cases the gait was improved, and in 11 cases the speech became more distinct. In a fair percentage, memory and the general intelligence returned, while in 3 cases the patients could again return to their vocation. Mercury and potassium iodide should be used in combination with the salvarsan, and in paretic dementia it is of advantage also to employ injections of the sodium salt of nucleinic acid.

The Treatment of Noma by Salvarsan. Nicoll[7] states that during the spring and early summer of 1912 there occurred an unusually large number of fatal cases of noma in the city of New York.

At the Scarlet Fever Hospital of the Department of Health there were 11 cases and 9 deaths. So much confusion exists in the nomenclature of the various ulcerative conditions about the mouth, especially in children, that it would seem expedient to arrive at some understanding as to what pathologic condition may properly be termed noma. Thus, small ulcerations occur on the inner surface of the cheek, from which smears show the presence, often in great numbers, of the characteristic fusiform bacilli and spirochetes, but which, nevertheless, readily yield to the application of caustics or milder local remedies. Other cases, not to be differentiated bacteriologically from the latter, do not yield to treatment, the ulcero-membranous process extending with startling rapidity to the gums and then to the neighboring alveolar process of the jaw. Again, marginal ulcerations about the teeth, together with a spongy condition of the gums, yield similar bacteriologic findings, but in otherwise healthy children do well under treatment by local application.

For the purpose of these observations, the term noma is to be understood as designating a rapidly-spreading gangrenous process, beginning usually on the mucous membrane of the cheek and gums and involving all surrounding tissues, including bone, showing little tendency to self-limitation, and from which fusiform bacilli and

(7) Arch. Pediat., November, 1912.

spirochetes may be obtained in great numbers in the smears.

Observations of this disease, extending over many years, especially at the New York Foundling Hospital, together with the study of most of the eleven cases referred to above, justify the writer in arriving at the following general conclusions:

The disease is essentially one of contagious disease hospitals and institutions for young children, but few typical cases having been reported from other sources.

It is largely confined to children under 5 years of age.

It attacks almost wholly those suffering from marked malnutrition, and whose resistance has been lowered as a result of previous disease.

Measles has long been regarded as one of the predisposing causes. In the eleven cases mentioned, four had an antecedent attack of measles during their convalescence from scarlet fever.

During the occurrence of an epidemic of noma a large number of minor ulcerative or ulcermembranous conditions are found about the mouth and gums in otherwise healthy children, disclosing the same organisms as those found in true noma, but showing little tendency to spread.

In the epidemic at the Scarlet Fever Hospital there was no positive evidence of direct contagion, the cases being scattered over five floors of the building.

Occurring, as it does, in patients in a low state of nutrition, the disease shows little tendency either to spontaneous recovery or to yield to local treatment, or even be influenced by radical surgical measure—curetting and removal of diseased tissues. Occasionally, a sequestrum of dead bone is formed, sharply marked off by healthy tissues, and spontaneous healing occurs. In the 11 cases mentioned, one took this course—that which occurred in a patient in previously fair general health. In another the same process was seen after treatment by salvarsan. The other 9 children died after treatment which varied from the application of strong caustics, and frequent cleansing of the parts, to removal, under an anesthetic, of all the visible diseased tissue,

including bone. It can not be said that radical measures had any apparent effect on the progress of the disease. Indeed, in some cases they seemed to act adversely.

In conclusion it would seem advisable, even in the absence of positive evidence that spirochetes are the specific organisms of noma, to make use of salvarsan in every case which does not immediately yield to local treatment, for it can not be denied that other remedies have had little or no effect in controlling this horrible disease, and the use of salvarsan is at least logical.

One Thousand Cases of Syphilis Treated With Salvarsan. Basing his announcement on an experience with a thousand cases in the Royal Naval Hospital, Kilroy[8] states that 2147 injections were given to 1000 cases—the first injection on August 16, 1911, and the last on November 8, 1912. No deaths have occurred. Seventeen men received only one injection; 865 received two injections; 75, three injections; 40, four injections; and 3, five injections. There were 3 cases of pain, stiffness, and swelling of the arm, causing some loss of service, but no permanent damage. In one of the cases quite recently he felt confident that he injected 250 c.c. of the solution into the space between the vein and its sheath. The reactions were on the whole very mild—twice a temperature of 104.8° F. The majority showed no rise of temperature. A few reactions were delayed to the next day. No reactions occurred on the day of injection. Herxheimer reactions were not very common, and it was difficult to separate them from arsenic rashes. Kilroy could not satisfy himself that they were more common in one particular type of case than in another, except that possibly florid early secondary cases provide them in greatest numbers. Very fibrous non-vascular tissues are resistant. Florid secondary syphilis gives the most dramatic results. There were three cases of pain, stiffness and swelling of the arm, but no permanent damage.

The needle used was of tantalum fixed in a modified McDonagh's holder, this being harder than steel or platino-iridium, not rusting, nor expensive. As to pace,

(8) Lancet, Feb. 1, 1913.

it is stated that one operator can deal with 12 cases an hour, provided he has very skilled assistants. He has made 21 injections in 1½ hours. About 50 per cent. of the men examined after having had salvarsan gave a negative Wassermann reaction.

Of the 2147 injections given to 1000 men with 13 invalidings, there were no deaths, and 22 clinical relapses re-admitted to Kilroy's hospital, 2 clinical relapses admitted to other naval hospitals, and 2 occurring in ships. Of 901 men receiving two injections, 21 reached the hospital as relapses; 2 were known to have occurred in ships, and 2 have been treated in other naval hospitals.

Of 68 men receiving three injections, 1 case reached the hospital as a clinical relapse.

In 14 men receiving four injections, none reached the hospital as a clinical relapse.

The Effects of Salvarsan on the Auditory Nerve. Bardes[9] calls the attention of the profession to the danger of impairing the hearing by giving an excess of salvarsan. The hearing of 47 patients who received the drug, mostly intravenously, was tested. Of this number 6 have become hard of hearing. Before they received the treatment hearing was normal. In 4 of the cases the aural disturbance was not noticed until the second injection had been given.

In all of Bardes's cases the onset was the same—that is, in from a week to a month after the injection head noises were perceived. In proportion as the noise grew louder the hearing became poorer. In two instances the noise is now subsiding, but alas! the deafness fails to improve.

An examination of the ears and adnexa of these patients revealed no morbid changes. Hearing tests showed diminished serial and bone conductions, especially for the high tones. The caloric tests showed dulled labyrinthine response. There are no symptoms of middle-ear or internal-ear irritation, such as pain, dizziness, vomiting, or nystagmus. The symptoms of the patient are those of a lesion affecting the auditory nerve.

(9) Amer. Pract., January, 1913.

Bardes suggests that the hearing be tested each time before giving salvarsan. If it is poor, or if head noises are present, the drug should be given with caution, and if the hearing is affected by the salvarsan, the dose should not be repeated until the ears are normal.

Salvarsan Given by Rectum. In children, the intravenous injection of salvarsan may be very difficult, since the veins are small or invisible, and since the patients often can not be kept sufficiently quiet for the operation. Salvarsan given by rectum is not absorbed with sufficient rapidity to be recommended for the syphilis of adults, in which energetic treatment is indicated. It is, however, an excellent method of treating the less virulent syphilis hereditaria tarda or non-syphilitic affections, such as chorea minor, anemia and afebrile tuberculosis. The dose employed by Weill, Morel and Mouriquand[1] is from 0.1 to 0.4 gm. The salvarsan is placed in a bottle with about 50 glass pearls and 40 c.c. of distilled water, and is shaken until completely dissolved. Fifteen drops of a 15 per cent. solution of sodium hydroxide are then added. This concentrated solution is then diluted with 100 c.c. of 0.5 per cent. salt solution and from 5 to 10 drops of laudanum are added. The injection should be retained at least 4 hours.

Arsenic Poisoning After Salvarsan. Eichler[2] reports a case where severe symptoms of arsenical poisoning appeared after an intravenous injection of 0.5 gm. of salvarsan. The symptoms were green stools mixed with mucus, incessant vomiting, a scarlatiniform eruption, severe acute renal inflammation and cerebral symptoms. There was no fault in the technic, and the water employed had been freshly distilled. Seven days before, the patient had received a slightly smaller dose without the least reaction. The patient was seriously ill for two days but finally recovered. In discussing the case the author remarks that idiosyncrasy or anaphylaxis seems unlikely. He believes that a cumulative arsenic effect was obtained, owing to the fact that the arsenic was

(1) Lyon Méd., No. 17, 1912.
(2) Münch. med. Wochenschr., Dec. 24, 1912.

retained in the liver. The patient did not feel well before the second injection was given, but this fact was not known to the physician. This case shows the necessity of having the patient constantly under observation when an injection of salvarsan is to be made.

Case of Gumma of the Iris After the Use of Salvarsan. Aaron Brav[3] reports the case of a man aged 24 who received an intravenous injection of salvarsan because of syphilis contracted five months before, and had no other treatment. Six weeks later he suddenly developed severe pain in the left eye, accompanied by photophobia and lachrymation. Four days later Brav found the left eye red, with a marked ciliary injection, the cornea clear, the pupil about two mm. in diameter, with a very slow reaction to light. On the margin of the iris there was a circumscribed reddish brown growth as large as two pinheads, with a small adhesion to the anterior capsule of the lens. The pupil dilated under atropine, except at the point where the tumor was situated. Under atropine, leeching, and mercurial inunctions, the tumor rapidly disappeared, and the eye was perfectly well at the end of two weeks.

[The history of the case, the stage of the syphilis, and the nature of the remedies to which the tumor responded, make it highly probable that the diagnosis should read, "papule of the iris." Gummata of the iris are rare, but they are sometimes seen in the tertiary stage of syphilis, and they respond best to large doses of potassic iodide.—Ed.]

Toxic Action of Salvarsan. Brandenburg[4] reports the case of a robust man of 38 who had had no symptoms of syphilis after thorough treatment ending four years before; his wife and children were healthy, and the Wassermann test was negative. But on general principles he thought he had better have a prophylactic injection of salvarsan, and an intravenous injection of 0.5 gm. was given him by a skilled and experienced Berlin specialist. Nausea, vomiting and diarrhea followed the injection at once, and the patient died the

(3) Ophth. Rec., June, 1913.
(4) Med. Klinik, July 6, 1913.

fourth day in convulsions. In a second case an intravenous injection of 0.1 and 0.2 gm. in the course of a few days was followed by paralysis of both arms. The patient was an anemic man of 33. The reaction of degeneration was pronounced, but conditions gradually improved in the course of six months, although the arms are still weak. There was no suspicion of syphilis in this case, and the salvarsan was given merely as a means of administering arsenic in convenient form to influence the pallor, physical depression and tendency to dizziness which had persisted after an operation for chronic appendicitis. No cause for the anemia was discovered.

Liver Changes Following Salvarsan. Severin and Heinrichsdorff[5] report that within a short time in the medical clinic in Breslau two fatal cases were observed following salvarsan, the patients presenting the picture of acute or subacute yellow atrophy of the liver. The first was a man of 30. He received three intravenous injections of 0.6 gm., each within a period of two months. The first two injections were given 2 days apart, the third after an interval of 48 days. He also received an injection of metallic mercury (0.5 quicksilver). Within a few hours after the third injection of salvarsan there was noted a slight tingeing of the scleræ, and on the following day a universal icterus terminating fatally after four weeks, with the picture of an acute yellow atrophy of the liver. Chemical examination of the liver gave a definite arsenical reaction, while a similar test of the spleen gave a definite but weaker reaction. The microscopic diagnosis of the post-mortem liver was chronic yellow atrophy with connective tissue increase.

The second case occurred in a woman of 29 who had received mercury injections repeatedly. Within two months she received 4 injections of salvarsan; 2 were given intravenously, the combined dosage being 0.95 Gm. (the salvarsan was alkalinised) and two injections totaling 1.0 gm. were received intragluteally. In all the patient received 1.95 gm. salvarsan. About 7 months after the last injection of salvarsan icterus set in, which

(5) Zeitschr. f. klin. Med., 1912.

ended fatally within 18 days with the picture of acute yellow atrophy and ascites. Only faint traces of arsenic could be detected in the liver. The pathologico-anatomic diagnosis was chronic yellow atrophy of the liver.

A Case of Acute Nephritis, With Uremia, Following Salvarsan. The points of interest in this case reported by Kahle[6] are:

1. The Wassermann reaction was positive, when using the Tschernogubow modification, five days after the appearance of the initial lesion. This would indicate that the Wassermann test can be of great value in clearing the diagnosis in early primary lesions in which the spirochetes cannot be found because the lesions have been subjected to treatment.

2. Great care should be exercised in the administration of salvarsan, bearing in mind that injury to the kidneys may follow even in cases in which those organs are sound, whereas in cases of incipient or latent nephritis the condition may be made acute by the drug.

3. In making examinations of urine, before or after giving salvarsan, we should not be guided solely by the presence or the absence of albumin, because there may be serious lesions of the kidneys in which the amount of albumin is no index to the severity of the lesions present. Granular and finely granular as well as hyaline casts may be present in great numbers when albumin is absent, or present only as a trace.

4. Although a diminished quantity of urine following the injection of salvarsan may be of no special significance, it should put us on our guard, more so if accompanied by other disturbances such as vertigo and headache. In over 175 injections given in private practice and in the clinics, a diminished quantity of urine was not infrequently observed. However, no serious complications followed except in the case reported here. Let it be noted that vertigo and headache were not present in any of the other cases.

5. A rash, erythematous or urticarial, may be produced by salvarsan as it is being eliminated by the skin.

6. Even when the kidneys have been severely dam-

(6) New Orleans Med. and Surg. Jour., February, 1913.

aged, all signs of trouble may disappear completely in a few days.

Action of Repeated Injections of Salvarsan and Neosalvarsan on the Blood. Karl Hedin[7] studied the effect of repeated injections of "606" on the blood of luetic patients. His conclusions are not uniform. The polymorphonuclear leukocytes seem to be unaffected. In some cases the eosinophiles seem to be increased and in one case decreased. In the majority of cases the blood pressure rises; also the red cells are increased, while the white cells remain about the same.

Intravenous Injection of Neosalvarsan in Concentrated Solution.[8] Recent experiences have shown the advisability, in the intravenous administration of salvarsan, of employing freshly distilled and sterilized water for the preparation of the solutions to be injected. Another necessary precaution has been that of using normal saline solution, in order to avoid destruction of corpuscles by laking when the fluid is introduced. In view of the fact that the sodium chloride used and the lead, lime, and other bodies that may be present in the distilled water itself have been considered responsible for some of the untoward phenomena closely following salvarsan (or neosalvarsan) injections, Revaut had adopted the plan of administering neosalvarsan in the smallest possible quantity of distilled water, thus doing away with both the sodium chloride and, in large measures, the harmful constituents of distilled water.

In a recent communication on this subject, Revaut (*Presse Médicale*, April 2, 1913) states that he has recently been injecting as much as 0.9 gm. of neosalvarsan dissolved in only 8 to 10 c.c. of distilled water. With this procedure, the neosalvarsan itself supplies the required isotonicity with the blood. Distilled water prepared several weeks before and kept in ampoules of the highest quality glass can be used directly without causing any systemic reaction. The solution is prepared after the constricting band has been applied to the patient's arm and the skin cleansed with alcohol. The

(7) Dermat. Wochenschr., April 19, 1913.
(8) New York Med. Jour., May 3, 1913.

drug is merely dropped into the water, and the solution drawn up into the glass syringe through a special glass tube containing a small wad of cotton, for purposes of filtration.

The needle is then adapted to the syringe, air driven out, and the injection at once given. All rubber tubing is thus eliminated and a more strict asepsis rendered possible. The whole procedure of preparation and injection occupies only two minutes. The author has given 420 such injections without the least untoward result.

Dangers of Neosalvarsan in Out-Patient Service. A. Wolff and P. Mulzer[9] sound a warning against the use of neosalvarsan in ambulatory patients. According to Lesser, some sixteen or eighteen such patients who had been treated with neosalvarsan have fallen unconscious in railroad stations, workrooms, hotels, and other places, and died a short time after. According to the authors' and other investigators' observations, neosalvarsan even in small doses, produces much more toxic effects than the old salvarsan. The authors have abandoned the use of a remedy which they regard as so dangerous.

The Intravenous Administration of Neosalvarsan. Nixon[1] says that patients do not, as a rule, experience any unpleasant effects either during or after the injection. Some complain of a slight metallic taste at the end of the injection, but it is quite transitory. Occasionally a slight headache comes on two or three hours afterward, and Nixon finds a cup of tea is the best remedy.

It is advisable to prepare the patients as if for an anesthetic by administering an aperient on the previous night, and giving a very light breakfast on the morning of the injection. Ordinary meals may be taken after the injection. The patients should remain at rest, preferably in bed, for two hours; if at the end of that time no unpleasant symptoms have occurred, he allows them to get up, provided they remain quiet. The first injection requires greater caution than subsequent ones, so

(9) Berlin. klin. Wochenschr., May 5, 1913.
(1) Bristol Medico-Chirurg. Jour., March, 1913.

far as after-treatment is concerned. If the patients stand the first injection well he allows them to get up and go out and about within a few hours after subsequent injections.

The dosage he employs is 0.75 gm. (No. V) for a first injection in a healthy man, with subsequent injections of 0.9 gm. (No. VI) at intervals of three days in practice two injections a week) until four or five injections have been given. The Wassermann reaction in an early case of syphilis is usually positive up to four injections; if it is negative a week after the fifth injection he does not repeat the dose unless a later test shows a positive reaction again. If after the fifth injection the reaction is not negative, he gives a sixth or seventh injection, with intervals of a week, taking a Wassermann test a week after each injection, and being guided as to a repetition of the dose by its results. He discontinues mercury for at least a fortnight before the Wassermann test is made, but afterward combines the treatments. Before finally deciding that no further neosalvarsan is necessary he makes a final Wassermann test, preceded by a fortnight without mercury.

Neosalvarsan is apparently contra-indicated in alcoholic debilitated subjects, or in those suffering from cirrhosis of the liver. He makes it a rule to examine the urine beforehand, ascertaining with particular care that the quantity secreted is normal, that the specific gravity is within healthy limit, and above all that the excretion of urea is sufficient.

A trace of albumin may depend on the syphilitic infection, but the presence of casts or sugar should, in the present state of our knowledge, deter us from administering any of the arsenic compounds intravenously. In cases showing signs of any syphilitic involvement of the central nervous system, especially meningitis, spinal symptoms, psychoses, or optic neuritis, great caution should be exercised, and if neosalvarsan is administered at all, the dosage should be very small at the outset.

Observing these precautions, neosalvarsan offers a very valuable adjunct to the mercurial treatment of syphilis. The patient's infectivity is quickly minimized

if not abolished, the visible signs of syphilis are speedily dispersed—*e. g.*, the chancre, roseola, and condylomata may disappear after the second injection. The symptoms are alleviated, and the Wassermann reaction changed from positive to negative, whatever this may really mean.

Time alone can demonstrate whether more solid advantages accrue, but alleviation to this extent is a gain not lightly to be regarded. At least, neosalvarsan offers the advantages aforesaid, as well as marked benefits in later manifestations, particularly tertiary lesions of the skin and mucous membranes. Some cases of locomotor ataxia and late nervous disorders have been improved.

In addition to these considerations it may be observed that neosalvarsan if cautiously prepared and administered shows little or no toxicity, that it is easily dissolved, requires no elaborate apparatus, and is injected at room temperature, while the use of redistilled water has proved the "reaction" after intravenous injections to depend more on some ill-understood quality of the water than on the drug employed.

Neosalvarsan Locally in Parenchymatous Keratitis. It is a well-known fact that neosalvarsan, administered in the usual way, has a pronounced effect on most specific lesions, but that it is often ineffectual in the treatment of parenchymatous keratitis, probably because it is difficult for the drug to reach the lymph-spaces of the cornea. Experimentally, it had been shown that a 2.50 per cent. solution of neosalvarsan does not irritate the conjunctiva of rabbits, so there seemed no objection to try the local application of the drug. In the case observed by L. Rosenmayer[2] energetic mercurial treatment did not prevent the extension of the process to the second eye. The author then applied a few grains of the drug to one eye and instilled a few drops of a 2 per cent. solution into the second eye. The extension of the process was at once checked in both eyes and the cornea soon commenced to clear up. It may be an advantage to apply the neosalvarsan suspended in an oily solution of

(2) Münch. med. Wochenschr., Nov. 5, 1912.

atropine, as decomposition of the drug is prevented in this way.

Fatality Following Injections of Neosalvarsan. Levy[3] reports the case of an alcoholic who was in the first stage of syphilis. He was given 4 injections of neosalvarsan at intervals of about one week (0.4 gm., 0.6 gm., 0.6 gm., 0.9 gm.). The last injection, like those which preceded, was well borne, but 36 hours afterward there appeared a scarlatiniform eruption which affected in turn the arms, the legs, the trunk and the face. Desquamation began on the fifth day and was profuse over the body. From the sixth day on fever set in, the temperature varying between 101.3° and 104° F., and the general condition became poor. The tongue was dry, dyspnea was intense, and pulse irregular, varying from 100 to 130 a minute. Heart and lungs were negative. The urine was normal in amount and contained no pathological elements; a test for arsenic was not made. The liver was not changed in size, but was slightly tender to pressure.

The patient remained in the same condition for nine days. He died in coma on the fourteenth day after a violent fit of dyspnea. There was no autopsy.

SCOPOLAMIN.

Unreliability of Scopolamin. Sieber[4] has always protested against the assumption that scopolamin is a harmless addition to the mixed-anesthesia methods. He calls attention to recent publications from the Tubingen clinic which show that the clinic from its former advocacy of method has now changed and denounces it as unreliable.

SEROTHERAPY.

Diphtheria Antitoxin.

Antitoxin Administration. Park[5] advocates the advantages of the single injection in all cases, and of the intravenous method in bad cases.

(3) Ann. des Mal. Ven., Vol. VII, No. 10.
(4) Zentralb. f. Gynäk., April 5, 1913.
(5) Boston Med. and Surg. Jour., Jan. 16, 1913.

These are the two things which Park wants to emphasize as possibly tending to a better treatment. The giving of larger doses than are necessary does no harm, except the expense to the city or patient; but an insufficient first dose, and in suitable cases the fact of not giving it intravenously, may be a serious mistake.

There is a great advantage in giving all in one injection, instead of in from 2 to 4 injections. Two goats were used in his experiments, one receiving 15,000 units subcutaneously in one injection, and the other 4 doses of 5000 units each at intervals of 8 hours. At the end of 18 hours we have 12 units in each cubic centimeter of the blood in the goat receiving 15,000 units, and have only 3½ units in the one receiving the divided doses, because only the first portion has had any possibility of being absorbed. It is only at the end of the third day that 20,000 units in divided doses equal the effect of the single dose of 15,000 units; and during the first day we have but one-third the effect. Park's opinion is that we should give in the first dose all that we think is required for the entire disease; and if we find it necessary to give a second dose, we have misjudged the amount necessary. He is certain that much of the good effect believed to be due to the second and third doses has been due to the fact of the further absorption of the first dose. As already stated, they are practically eliminating at the Willard Parker Hospital in New York the second dose, and the results seem as good as at Kingston Avenue Hospital, where the same size initial dose is repeated in later doses. It should be borne in mind that a thousand times as much antitoxin as is required for the amount of toxin in a case is given. The great excess is for the purpose of pushing it out into the tissue fluids of the diseased parts and wherever toxin may have passed.

Before closing, he writes of the intravenous injection, and urges it not only in cases of malignant diphtheria but in all cases of tetanus. The difference, during the first day, in the amount of antitoxin in the blood when injected intravenously and when injected subcutaneously is very great. At the end of 6 hours one has, with a suitable amount by the subcutaneous method, two units,

and by the intravenous method 20 units in each cubic centimeter. As the hours pass, the one diminishes and the other increases; but even at the end of 24 hours we have 12 units against 6 units. He feels certain that 5000 units given intravenously has as much effect as 20,000 given subcutaneously. Intravenous injections of refined antitoxin have been made by them in nearly 200 cases and have given no bad results. They have given a large number of children and adults other serums, intravenously, in large amounts, and in all their experience they have had only one patient who showed bad symptoms. In little children one must cut down on the vein, but with adults and larger children it is a very simple method. The serum must always be warmed to blood heat before injecting. Park thinks that in all cases of septic diphtheria one should give a dose intravenously, but in mild and early cases it is sufficient to give it subcutaneously. Intramuscular injections are absorbed in about one-half of the time required by the subcutaneous ones, when the serum stays in the muscle substance; but in practice it often escapes.

In tetanus he has frequently seen the life-saving action of the intravenous injection. He believes it is almost criminal negligence not to give an intravenous injection at the first moment possible. Consider a case of tetanus in which, by the symptoms, we know the most important cells of the body are already affected; is it not foolishness to rely on a subcutaneous injection with its slow absorption? Park has urged the surgeons in New York to keep antitoxin on hand, and at the very first sign of tetanus to inject intravenously about 20,000 units of antitoxin. If only a smaller amount is available, that should be injected immediately, and a larger amount later. Time is more important than quantity. In those cases of continuing rigidity Park admits he advises to go on giving smaller injections every 12 hours for several days, but the more he tests the blood in these cases, the more doubtful he is as to the value of repeating the injections. At intervals of 24 hours they keep up the strength of antitoxin. He is sure that a large intravenous injection given a few hours after the onset

of symptoms will save a considerable percentage of patients who would otherwise die. The usual practice after first seeing the patient is to wait 12 hours in order to be certain of the diagnosis, and then to call at the laboratory to get antitoxin; thus from 12 to 18 hours are wasted. We know that many animals treated within a few hours after the injection of tetanus toxin intravenously by large doses of antitoxin are saved, and our experience at the bedside had proved the wisdom of large initial doses. Let us, therefore, combine laboratory results with bedside observations.

Large Doses of Antitoxin Given Early a Means of Preventing Laryngeal Stenosis. Fischer[6] reports four typical cases, and says that from a study of these cases it is evident that effectual treatment consists in giving a large injection of antitoxin at the beginning of the treatment. In a severe case 10,000 to 20,000 units should be injected at the beginning; whether or not more antitoxin should be injected must depend on the result of the first injection. In all of the cases reported the first injection appeared insufficient, and it does seem that the additional doses help to modify the toxemia. Park maintains that one injection given at the beginning, be it 5,000 or 10,000, is sufficient; he maintains that antitoxin can be found in the blood many days after such injection, and since antitoxin can be found in the blood he insists that no more should be injected.

Fischer's rule in intubation and extubation has been: (1) Avoid force; thereby avoid injury. This rule has been his greatest aid in preventing retained tubes. (2) Do not hurry. While in a severe laryngeal stenosis a given amount of haste is necessary in selecting the proper sized tube and making preparations, yet when it comes to the introduction of the tube the inflammatory process and subnormal condition must be remembered; hence, one should go slowly. The nervous and frightened child must be quieted, especially when considering extubation. His rule is to give an antispasmodic for 12 hours preceding the removal of the tube. Codeine, from $\frac{1}{8}$ to $\frac{1}{4}$ gr. to a child 2 years old or over, repeated in 3

(6) Med. Rec., Feb. 22, 1913.

hours for 4 doses, or 10 gr. doses of sodium bromide with 2 grains of chloral hydrate, repeated in 6 hours (2 doses only), will allay nervous excitability and have a quieting effect. The antispasmodic should be continued for 24 hours after the removal of the tube. The spasm due to fear of the operating table when repeated intubation and extubation are practiced may in rare cases require an inhalation of a few drops of ethyl chloride prior to extubation. Dover's powder is a valuable drug as an antispasmodic prior to extubation. Intralaryngeal medication consists in applying a coating of medicated gelatin to each tube. Such medication as orthoform, 10 per cent. in gelatin or ichthyol-gelatin, served Fischer well in a case of persistent tube, reported seven years ago. Owing to the thickness of the coating of gelatin a tube one size smaller than usual is required.

Subcutaneous Method. In severe cases of diphtheria it is better to give 10,000 units by hypodermic means. As a rule some benefit should be noted within 12 hours after such treatment.

Intravenous Method. If septic manifestations are evident, especially if the case has been untreated for many days, the most rapid method of destroying the diphtheritic poison is by injecting into the median basilic vein at least from 10,000 to 20,000 units.

Urticaria Following Diphtheria Antitoxin. D. Miltimore,[7] of Nyack, N. Y., reports an interesting case of urticarial rash and sciatica following a prophylactic injection of diphtheria antitoxin. The patient was a young adult male of good habits, slender build, slightly nervous temperament, and somewhat predisposed to rheumatism. Following a prophylactic dose of diphtheria antitoxin (500 units) four years previously he had had a very slight urticaria, but no subsequent urticaria up to the present attack, and no previous sciatica.

Recently he was given a prophylactic dose of 1,000 units of diphtheria antitoxin of standard make in the right buttock. In 24 hours there was a great, sharply marginated edema of the buttock with elevation of temperature one-half degree and a raising of the pulse rate

(7) Merck's Arch., March, 1913.

about 10 beats a minute. There was a typical pronounced urticarial rash beginning in parts adjacent to the right buttock the next day and gradually extending until in five days it was universal, including even the lips. The patient ached all over. There was pain and tenderness along the right sciatic nerve from the sciatic notch to the knee. On the sixth day the left side became similarly affected.

The usual local measures as well as vigorous saline catharsis, salol in large doses, potassium permanganate, hexamethylenetetramine, and acetphenetidine were all ineffective. On the eighth day all other medication was discontinued and quinine, gr. 15 in divided doses, was given for 3 days. Marked improvement was apparent at the end of 24 hours and all symptoms had disappeared by the end of the third day.

Vaccination Against Diphtheria. Schreiber's[8] experiences were some of those on which Behring based his announcement in regard to the efficacy of his method of immunizing against diphtheria. Schreiber says that the conflicting experiences in regard to the immunity conferred by one attack of diphtheria are explained by the large amounts of antitoxins found in the blood of some persons, while others have little or none. It will be interesting to determine in future research the connection between large proportions of antitoxins in the blood after diphtheria and the freedom of such persons from new attacks of the disease later. Behring's method of vaccination does not induce active immunization until twenty-one days after the first injection. It is possible, Schreiber remarks, that it might be advisable to inject antitoxin while the vaccination is under way. Matthes' experience in one clinical case seems to indicate that the combination of the two methods did not detract from the specific action of either. Schreiber reports parenthetically the case of a robust woman of 23 who had a severe typical attack of anaphylactic phenomena on injection of diphtheria antitoxin fourteen days after she had been treated with antitoxin during an attack of diphtheria. He knows of no case on record in which

(8) Deutsche med. Wochenschr., May 15, 1913.

such severe and protracted disturbances were observed after such a long interval.

Anaphylaxis and Repeated Injections of Serum. The *British Medical Journal*[9] says that a correspondent has raised the practical question whether a repeated injection of serum in the form of diphtheria antitoxin undertaken after a shorter or longer period is attended with any real danger, and how such dangers can best be prevented or dealt with. This practical aspect of the anaphylaxis problem is unfortunately not yet cleared up. It will be remembered that von Pirquet and Schick analyzed the symptoms which frequently follow the injection of serums, and came to the conclusion that the complex of rash, fever and severe illness which is met with some seven to nine days after an injection is an anaphylactic phenomenon. Under ordinary circumstances the production of hypersensibility to a protein is induced by the repetition of the absorption of the same protein material, and is now ascribed to the rapid dissociation of the protein molecule. In actual practice very large numbers of human beings are subjected to injections of serum with a more or less considerable interval between the injections, and only a few have shown serious symptoms. A few deaths have been reported, notably the case closely investigated by Rosenau and Anderson.

While recognizing that the future may reveal factors which are at present unknown, it seems at present justifiable to state that the chances of a dangerous fall in blood pressure resulting from a second injection of serum in the human subject are not great. But it can not be denied that some risk does exist. Another matter on which the practitioner who employs diphtheria and other antitoxins, but who can scarcely find time to follow the bewildering literature on the subject, naturally needs information is what measures can be taken to prevent the occurrence of the shock, or, if it occurs, to treat it. In the laboratory anti-anaphylaxis can be induced, but how far this could be employed in human subjects has not been determined. A number of chemical substances, such as calcium chloride, have been suggested for the

(9) Brit. Med. Jour., Oct. 19, 1912.

purpose of avoiding the shock, but it appears extremely doubtful whether reliance can be placed on these preventive measures. Anesthesia with ether holds out a much better promise, especially if the symptoms are recognized at the earliest onset and the anesthetic can be applied at once. On the other hand, the physician may to a certain extent gather from the reaction to the first injection whether any special susceptibility is to be anticipated. If there is reason to fear that such is the case the renewed application of the protein should be small, but it may be repeated in larger amounts within a short time if a marked degree of anaphylaxis is not evidenced. It must further be pointed out that this applies with equal force to bacterial vaccines, tuberculins, etc. A hypersensibility to tuberculin may be produced by the disease itself, and this accounts for the damage which tuberculin has done when applied without precautions or control

Meningitis Serum.

Serotherapy in Epidemic Meningitis. The data brought together in this report have been gathered by Flexner[1] from a wide territory and for a period extending over several years. The antimeningitis serum was first employed in 1906, and the latest figures relating to its use included in this report were furnished in 1912. He says that there is no longer doubt that the serum has come to be applied under conditions fairly representing all known manifestations of epidemic meningitis. Hence, the test of the serum treatment may be regarded as having been a rigorous one. The initial difficulties surrounding the administration by direct subdural injection have been largely overcome and doubtless will be still further mastered. Already the serum is being successfully applied in private as well as in hospital practice. This gain will probably be reflected in a still further diminution of the mortality since early injection plays such a large part in determining the results achieved. The 1,300 cases studied in this report are a part only of a far greater number of cases actually treated with the

(1) Jour. Exper. Med., May, 1913.

serum supplied by the Rockefeller Institute. It was not found possible to secure histories of all the patients treated; but Flexner does not believe that the results of the analysis would have been essentially different if reports of a still larger number of cases had been returned. The decision arrived at is not based on statistical computations alone, but on objective data as well that are not readily misinterpreted.

The number of serum-treated patients subjected to analysis is 1,294. They have not been selected and a single exclusion has been practiced. The results were: Recovered, 894; died, 400—30.9 per cent.

The histories of 830 cases permitted of a judgment as to the manner of termination, and it was ascertained that in 30 per cent. the cessation was abrupt, or by crisis. Of the 1,204 patients, 56 showed relapses after greater or less intervals of time. Prompt resumption of the serum injections often but not invariably sufficed to control and suppress the reinfections. Of the 56 patients, 40 recovered and 16 died. Among them the mortality was 28.6 per cent., indicating that relapses respond somewhat less well to the serum than the pri-

Mortality according to the period of injection of the serum:

Period of Injection	No. of Cases	Recovered	Died	Per Cent. Recovered	Per Cent. Died
1st to 3d day	199	163	36	81.9	18.1
4th to 7th day	346	252	94	72.8	27.2
Later than 7th day	666	423	243	63.5	36.5
Totals	1,211	838	373	69.2	30.8

Mortality according to age:

Age	No. of Cases	Recovered	Died	Per Cent. Recovered	Per Cent. Died
Under 1 year	129	65	64	50.4	49.6
1 to 2 years	87	60	27	69.0	31.0
2 to 5 years	194	139	55	71.6	28.4
5 to 10 years	218	185	33	84.9	15.1
10 to 20 years	360	254	106	70.6	29.4
Over 20 years	288	180	108	62.5	37.5
Age not given	18	11	7	61.1	38.9
Totals	1,294	894	400	69.1	30.9

Mortality according to age and period of injection:

Age	Injected 1st to 3d Day				Injected 4th to 7th Day				Injected Later than 7th Day			
	No. of Cases	Recovered	Died	Per Cent. Died	No. of Cases	Recovered	Died	Per Cent Died	No. of Cases	Recovered	Died	Per Cent Died
Under 2 years.....	13	12	1	7.7	37	28	9	24.3	159	81	78	49.1
2 to 5 years.....	30	24	6	20.0	66	49	17	25.8	93	63	30	37.3
5 to 10 years.....	55	49	6	10.9	69	61	8	11.6	77	61	16	20.8
10 to 20 years.....	67	58	9	13.4	106	73	33	31.1	171	115	56	32.7
Over 20 years.....	34	20	14	41.2	65	39	26	40.0	164	101	63	38.4
Totals	199	163	36	18.1	343	250	93	27.1	664	421	243	36.6

mary infections. The complications and sequels are reduced in number. In fact, the number of permanently injured among the serum-treated has become very small. Of all the severe sequels deafness has remained least influenced. Unhappily, injury to the internal ear takes place very early and sometimes before the diagnosis of meningitis has been made. In view of the great reduction in other severe effects, Flexner hopes that even this one may be diminished by a more uniformly early application of the serum. The arthropathies have not only been reduced in frequency, but they have been shown to be amenable to direct injections of the serum. Undoubtedly the tendency to hydrocephalus in the young has been diminished, and the intraventricular injection of the serum has operated in several instances to abolish infection and inflammation of the cerebral ventricles and to re-establish communication between the ventricles and the subdural space of the spinal cord. Recovery, therefore, has been rendered complete.

Accidents Following the Subdural Injection of Antimeningitis Serum. Simon Flexner[2] admonishes us not to lose sight of the fact that in epidemic meningitis we are dealing with a highly fatal malady, and the one means now possessed to combat it is the antimeningitis serum. It is not justifiable, therefore, to withhold the remedy, in spite of some small risk, in view of the far greater dangers from the disease itself. Nor should we

(2) Boston Med. and Surg. Jour., June 19, 1913.

always ascribe serious symptoms to the serum, even when they follow closely on the treatment. Sudden death not infrequently occurs in epidemic meningitis; cases have been reported in which death has taken place while the serum injection was being prepared, and even before lumbar puncture has been done. The antimeningitis serum should not be discredited because of an unfortunate experience. When everything is considered, such action seems hardly defensible.

Serum in Hemorrhage.

Treatment of Hemorrhage by Precipitated Blood Sera. Clowes and Busch[3] write fully on this subject and reach these conclusions:

1. Blood serum is found to be of considerable value in the treatment of all forms of hemorrhage due to low blood coagulability resulting from diminished thrombin content.

2. Human serum is in no wise superior to that of a variety of animals.

3. Blood serum precipitated by means of a suitable mixture of acetone and ether is fully as effective as fresh serum, if not superior to it. Precipitated serum is freely soluble and possesses the advantage over fluid serum of being sterile, always available, and retaining indefinitely its capacity to stimulate coagulation of the blood.

4. The product obtained from horse serum appears to yield more uniformly satisfactory results than that obtained from the sera of other animals and exerts no deleterious effects.

5. The determination of the rapidity with which sera and solutions of precipitated sera at comparable concentrations cause coagulation of citrated blood plasma affords a simple means of estimating the relative activity of the preparations in question, and consequently of standardizing precipitated sera for clinical purposes.

Antistreptococcus Serum.

Antistreptococcus Serum Used Locally in Vaccinal Ulcers. Sexton[4] feels sure the profession will welcome

(3) New York Med. Jour., Jan. 4, 1913.
(4) Arch. of Pediat., February, 1913.

any form of treatment that will shorten the duration of and lessen the number of infected vaccinal ulcers.

We do not have to look far into the past to see whole provinces practically depopulated by the scourge of smallpox.

With the advent of vaccination we note a sudden and continuous decrease in the number of epidemics and the percentage mortality, until to-day epidemics are practically a thing of the past.

This condition can only be accounted for in one way, *viz.*, through the influence of vaccination.

There have been vaccinated in the Willard Parker Hospitals, during the past four years, 45,735 persons. Naturally out of this vast number there were many infections, due in every instance, apparently, to the introduction into the wound of some extraneous microörganisms which produced the tissue necrosis.

There is no condition which offers greater resistance to ordinary treatment than vaccinal ulcers, and it was with a view to lessening the number and persistence of these that the use of serums locally was begun some three and one-half years ago. From the first use of antistreptococcus serum marked improvement was noted in these indolent, punched-out vaccinal ulcers, and Sexton asserts that he has yet to see one that has not responded readily to the constant application of antistreptococcus serum used locally in the form of a wet dressing.

The wound is filled with the serum; this is covered with a small wet dressing of same, and over this is placed an oiled silk dressing in order to maintain the moisture as long as possible. The dressings when dry become very hard and stiff. In order to obviate the unpleasantness caused by this, the oiled silk is removed and the dressing remoistened without disturbing it, three or four times daily.

The rapidity with which these indolent ulcers respond to this form of treatment is remarkable.

Various other serums have been tried, including normal horse serum, but the results from their use have not been satisfactory.

Human Serum.

Serotherapy of Pemphigus. In the case described a woman of 48 had suffered for 2 years from severe and constantly recurring pemphigus rebellious to all treatment, including salvarsan. She was emaciated to a skeleton, with fever and occasional delirium and diarrhea and had been unable to leave her room for two months when Praetorius[5] made an intravenous injection of 20 c.c. of blood taken directly from her husband. No attempt was made to defibrinate or centrifugate as the little operation had to be done in the home. No by-effects were observed; but the curative action was amazing. By the third day the manifestations of the disease began to subside and by the end of the week recovery was complete and she started on a journey the third week. There has not been the slightest sign of recurrence of symptoms during the nearly eight months to date. The skin over the entire body seems normal and the patient has gained 18 pounds in weight. No local measures were applied with the serotherapy.

Autoserotherapy.

Autoserotherapy in Serofibrinous Pleurisy. M. Fishberg[6] believes that this method of treatment is a simple one and ought to be tried in every case of pleural effusion in which the fluid is not purulent. Indeed, inasmuch as in practically every case of pleurisy showing signs of effusion exploratory puncture is to be performed with the view to determining the character of the fluid in the pleural cavity, it is advisable, when the contents of the pleural cavity are found to be serous, that the needle should not be withdrawn completely, but that when its point is brought to the subcutaneous tissue it should be ejected then and there. The quantity of fluid to be injected subcutaneously need not be very large; from 2 to 5 c.c. is quite enough. In favorable cases it is observed that within two or three days the subjective symptoms—the pain, the dyspnea, the prostration, etc.—are ameliorated or entirely disappear, while physical

(5) Münch. med. Wochenschr., April 22, 1913.
(6) Jour. Amer. Med. Ass'n., March 29, 1913.

exploration of the chest shows that the upper level of the fluid is lower than it was before the injection. Within a week or ten days the fluid in the chest disappears altogether in about 80 per cent. of the cases. In some patients it may be necessary to repeat the treatment several times every two or three days before any salutary effects are evident. In about 10 or 15 per cent. of cases this mode of treatment seems to fail, but even in this instance no harm is done to the patient.

STOVAINE.

Spinal Analgesia. Houghton[7] holds that the choice of anesthetics lies between tropacocaine and stovaine.

The depth and duration of the analgesia produced by similar doses of either drug are practically the same; while complications such as headache or nausea are not more frequent after the use of the one or the other.

There are only three ways by which analgesic solution injected through the second lumbar interspace can make its direct effects felt in the middorsal region, or even higher, as is sometimes the case in this procedure. These are either (1) by slow diffusion; (2) by a shifting upward of the whole column of cerebrospinal fluid in which it is suspended; or (3) by gravitation, if the injected compound is heavier than the liquor spinalis.

It is easy to observe the behavior of one fluid injected slowly into another, if the fluid be colored with an aniline dye. If both have the same temperature and specific gravity, the injected fluid forms at first a distinct colored cloud, which slowly diffuses through the mass into which it enters if the latter is in a state of rest.

On the other hand, if the injected fluid has the same temperature, but a greater specific gravity, it sinks rapidly in a definite stream to the bottom of the second fluid, and remains there as a distinct stratum without diffusion for a period proportionate to its density and viscosity. A consideration of these points shows that if we aim at localizing a spinal injection to any particular region of the cord we can utilize the force of gravity acting on an injected compound of greater density than the

(7) Jour. Royal Army Med. Corps, vol. xix, 1912.

cerebrospinal fluid. This, the heavier injection, sinks to the lowest part of the canal, independently of any displacement of the liquor spinalis. Here it remains more or less undiluted, in contact with the surrounding structures.

A 5 per cent. solution of tropacocaine has a specific gravity of 1.0106, which is considerably higher than the specific gravity of the cerebrospinal fluid, 1.007. This probably accounts for the undoubted success which has attended the use of this compound.

A 5 per cent. solution of stovaine in distilled water has a specific gravity of 1.0064, and a freezing point of 0.0585° C. This solution is lighter than the cerebrospinal fluid, and will not gravitate, but will slowly diffuse at the place of injection.

We can not, therefore, expect to obtain exactly uniform results if we employ solutions of widely different densities. A failure to appreciate this may largely account for the irregularities which have been reported in the action of these drugs.

To raise the specific gravity of the stovaine solution, Barker has added 5 per cent. of glucose to the injected fluid, so that a solution containing 5 per cent. stovaine plus 5 per cent. glucose, and distilled water 90 per cent., has a specific gravity of 1.0230.

This solution is heavier than the cerebrospinal fluid, and will, on injection, gravitate to the lowest portion of the spinal canal. The glucose has no irritating effect when thus injected, and beyond rendering the solution slightly viscid, and thus helping localization, its addition has little or no action on the contents of the canal.

With such a solution of comparatively high density and viscid character, diffusion and consequently dilution of the stovaine is limited. Thus, a smaller dose can produce a full effect, and the drug by means of gravity can be so localized as to exert its specific action at the desired level of the cord.

For use in spinal analgesia the "Record" syringe of 2 c.c. capacity is the best. The needle has a close-fitting stylet, and the point is oblique and hollow so as to secure sharpness without too much lengthening of the terminal

opening. As the operator is dealing with very small amounts of injection fluid, and the loss of two or three drops would make a considerable difference in the extent of the analgesia, a means has been devised by Barker to insure the delivery of all the injection compound through the point of the needle. This consists of a second cannula slender enough to fit the first hollow needle loosely, and long enough to project beyond its point about 1 mm. when pushed home.

A notable point in this procedure is the complete muscular relaxation which is obtained after the use of tropacocaine and stovaine.

This is especially remarkable during anal and abdominal operations. The muscles are found flaccid and toneless and there is an entire absence of that straining which so frequently hampers a surgeon in cases in which a general anesthetic is employed.

The most constant phenomena following an injection of this solution are first a loss of the knee, plantar, and cremasteric reflexes; subjective sensations of numbness and tingling in the feet; analgesia of the perineum, feet, legs, scrotum and penis, gradually reaching the abdomen. Sensation of pain is lost before that of heat and cold, while tactile sensation is the last to disappear and the first to return as the effect of the drug passes off.

During the operation, usually about fifteen minutes after injection, the patient sometimes becomes pale and sweats, he may be nauseated and vomit, but as a rule this passes off in five minutes. The pulse rate is usually slowed and the blood pressure lowered.

Respiratory distress, as evidenced by "air hunger" and inability to cough, is sometimes seen. This is dependent on intercostal paresis from high analgesia, but it does not affect all patients to the same degree, the element of nervous apprehension being more marked in some than in others.

On the return of sensation the patient often complains of a headache, which is seldom persistent or severe, and generally yields to a dose of bromide. Vomiting occasionally occurs, but is not prolonged. The temperature

is nearly always raised to 100° F. for 48 hours, when it returns to normal.

Later sequelæ have been reported, such as paralysis of the ocular muscles and paraplegia, but one can not avoid the conclusion that these are due to a faulty technic.

The stovaine-glucose solution, which has now been in use for 6 years, can be obtained in glass ampoules, each of which contains about 2 c.c. of a 5 per cent. solution of stovaine and glucose.

The filled ampoules are carefully sterilized by boiling at 110° C. before being finally sealed. The amount of this solution necessary for injection in any one case should not exceed 1.2 c.c. or 6 cg. of stovaine. One cubic centimeter of this solution containing 5 cg. of stovaine usually produces an analgesia up to the level of the umbilicus, lasting from 50 to 65 minutes.

The amount of danger during the actual narcosis appears to be in direct ratio to the height of the analgesia. So long as the diaphragm is able to perform its function, danger to life is trifling. This is now well recognized, yet the production of analgesia above the nipple line is often attended by a feeling of faintness and air-hunger in the patient due to paralysis of the intercostal muscles. Though not dangerous, this is unpleasant and can be avoided.

Cases of paralysis of the ocular muscles have been reported on the Continent, but in several thousand cases it has only once been noticed, and then was of a temporary character.

The range of applicability may now be considered, and although successful operations on the head have been reported by Jonnesco with a stovaine-strychnine injection, these were not unattended by accidents.

Operations, however, such as the radical cure of hernia, appendectomy, and operations on the bladder and rectum are particularly suitable for spinal analgesia. In fact, Houghton uses spinal analgesia as a routine method for all operations below the level of the umbilicus. This means that the injection fluid must reach the sixth dorsal segment.

This method has also been used for gastroenterostomy and operations on the kidneys, and for the removal of pieces of rib, but the author does not attempt to produce analgesia in any region supplied by nerves above the fourth dorsal segment.

Having lately completed a series of 400 operations under spinal analgesia at the Cambridge Hospital, Aldershot, in all of which the injection was quite satisfactory, and in none of which was there any cause for anxiety as to the patient's condition, he concludes by recommending the method to those engaged in surgical work, as it is most useful in the army.

STRYCHNINE.

Strychnine in Broken Cardiac Compensation and in Collapse After Acute Affections. In a paper read before the New England Pediatric Society, L. H. Newburgh,[8] of Boston, stated that there is no pharmacologic basis for the assumption that strychnine, in medicinal doses, has either a pressor effect or that it increases the work of the heart. Mayer and Denys showed that nothing less than the convulsive dose raises the blood pressure; and Igersheimer showed that the heart is not affected until enormous doses are reached and that this effect is a slowing of the circulation. The strychnine used was tested on frogs and was found to be highly active. The drug was also given in eight cases of broken cardiac compensation in very large doses, but with an entirely negative result. It was also given in large single and repeated doses in eight cases of pneumonia in all stages and in eight other persons, all of whom showed hypotension. No effect on pulse or on systolic or diastolic blood pressure was observed.

Commenting on the paper, W. P. Lucas stated that he had been conducting some experiments with strychnine in cardiac conditions in children and found that the blood pressure findings were very much harder to get than in adults and that they can not be accurately recorded. The findings so far as he could determine had been negative. While the patients were on strychnine

(8) Merck's Archiv., July, 1913.

the symptoms appeared to be benefited, but there was no progress.

G. C. Shattuck stated that in a large number of cases of pneumonia, typhoid and heart disease his experience with stimulants was far from satisfactory. In a few cases, however, he observed well-marked changes in the heart sounds and pulse after the use of strychnine. He also noted similar changes in a patient with phthisis who was taking 1.30 grains three times a day for several days. The heart sounds in this patient were considerably louder than normal, the second aortic being especially accentuated, and the pulse bounding. Dr. Shattuck said he hesitates to believe that there are no conditions in which strychnine is of value as a stimulant.

J. M. Knox stated that some years ago Cook carried on a series of observations to determine the effect on the blood pressure (the systolic pressure only was taken), of strychnine, digitaline and salt solution. His results showed that the rise in pressure following digitaline is more prompt, but of less duration, the curve having a sharper summit. Following strychnine the rise is a little less prompt, but the effect is longer. The salt solution is a little less certain, but usually the rise in blood pressure is not so great, but the duration extends over a number of hours, making a very obtuse summit to the curve. These observations were made shortly after the beginning of the use of the instrument for measuring the systolic blood pressure and the results may have been untrustworthy.

THYMOL.

Thymol in Hookworm Infection. Leys[9] says that the drugs most in favor for hookworm are: (1) thymol, (2) betanaphthol and (3) a combination of oil of eucalyptus with chloroform and castor oil. His series of cases being too limited for comparisons of treatment, it was determined at the outset to adhere to one drug and to an unvaried dosage. This dosage was warranted by the facts that all the patients were between 17 and 25 years of age. None weighed less than 110 pounds, all were in

(9) U. S. Navy Med. Bull., January, 1913.

fair to excellent general health and all were treated under hospital conditions in bed and under observation and control. The dosage of thymol was the largest commonly approved, 30 grains three times at intervals of an hour, preceded and followed by 24 hours' fasting and 1 ounce of Epsom salts. Each patient thus received 90 grains of thymol within a period of two hours. The same course of treatment was given a second and a third time in every case with intervals of from 10 to 15 days whether needed or not, in order that records might be uniform and complete. There were no ill effects in any case, and only a few patients complained of an uncomfortable burning sensation in the abdomen. The stools were sometimes examined for ova consequent to the first and second course of treatment; always after the third course. All stools were saved and all parasites counted.

The total number of parasites removed from 90 patients was 4,061, or an average of 42 hookworms per patient. Of the 4,061 worms removed, the first course of treatment removed 3,585, the second course 353, the third course 116. A fourth course, required in only three of the patients, removed 7 worms. The average percentage of the total number of parasites removed by each of the three treatments was, therefore, ignoring fractions: first course 88 per cent., second course 9 per cent., third course 3 per cent. These figures represent a higher percentage required by the first course of treatment than the reported general experience with smaller doses of thymol or with various remedies and varied dosage.

In 27 cases, in which the total number of worms varied from 2 to 144, all worms were expelled by the first course of treatment. In 47 other cases, in which the total number of worms varied from 2 to 406, all worms were expelled by the first and second courses of treatment. In 19 other cases, in which the number of worms varied from 2 to 467, the worms were not all expelled until after the third treatment. In the remaining 3 cases, in which the total number of worms varied from 35 to 525, the worms were not all expelled until after the fourth treatment.

Should one be called on to treat a considerable number of persons whose age and physical condition would warrant the full dosage followed here, and in circumstances in which it would not be practicable to count all parasites expelled at each treatment and not practicable always to examine stools for ova before treatment is repeated, the tabulated results in this series of 96 cases indicate the following rule of practice as giving a reasonable assurance of satisfactory results:

1. Diagnosis by scanning three slides representing nine portions of a natural stool.

2. Course of treatment: First day, in bed; light liquid diet, 1 ounce; Epsom salts at 10 a. m. Second day, in bed; thymol finely triturated, in capsules, grains 30 at 6, 7, and 8 a. m.; 1 ounce Epsom salts at 10 a. m. Save all stools. Count parasites.

3. If 150 parasites or more are found, three more such courses of treatment are likely to be required; if 50 parasites or more, two more courses are required. If fewer than 50 parasites are found, one more ounce of treatment is required. Following this rule, all parasites will have been expelled in the vast majority of cases, and probably not more than one or two worms will remain in any case.

TROPACOCAINE.

Spinal Anesthesia by Tropacocaine. J. T. J. Morrison[1] sums up the position of spinal anesthesia as follows: It is a procedure of proved value and simple technic. Its province is subdiaphragmatic operations. There is no prohibitive age limit. By blocking afferent paths it prevents surgical shock. It induces muscular relaxation, quiet breathing, and abdominal stillness, and thus conduces to rapidity and safety in abdominal surgery. Used with discretion in conditions of extreme asthenia and instability of the medullary centers due to toxemia, exhausting disease, traumatic shock, and old age, it is superior to ether and chloroform. It promotes the patient's comfort and nutrition in the post-operative stage. Its scope is amplified with the aid of scopolamine

(1) Brit. Med. Jour., June 21, 1913.

and morphin. By lowering blood pressure it tends to faintness and respiratory depression. The patient should therefore be carefully watched after injection, and treated as required by means of diffusible stimulants, pituitrin, saline infusion and artificial respiration. In a small percentage of cases it is inadequate, and must be supplemented by general anesthesia. It increases the possibility of surgery by facilitating the work of a surgeon in the absence of a competent anesthetist or assistant. The procedure should be taught in medical schools.

VACCINE THERAPY.*

General Discussion of Vaccine Treatment.[2] The attitude of the profession at large toward the use of tuberculin in the treatment of tuberculosis has been one of skepticism as to the results achieved and of hope for the future, the skepticism being based on the general failure of the method as employed by those without special skill, but gifted with ordinary common sense, the hope on the sometimes brilliant results achieved by individual physicians who are firm believers in this form of treatment and who are further sufficiently trained to be skilled observers of clinical phenomena. It is true, however, that the verdict of the man who starts out with a fixed belief must be received with caution. A further element of hope is based on the expectation of the possible elaboration of a more potent vaccine. At present the results of clinical experiences, particularly if these be large and carefully followed, are of vivid interest to the entire profession. Hence Raw's report (*Liverpool Medico-Chirurgical Journal,* February, 1913) on 640 patients treated during the last fifteen years is of major importance, representing as it does, a study conducted for a long period of time, and with, apparently at the beginning, an entirely open mind as to the results to be expected. As to the variety of tuberculin employed, he selected from the many on the market Koch's new tuberculin bovine and Koch's new tuberculin human, since he found them easily tolerated and not likely to produce general reac-

* See also vol. VI, page 7, of the current Practical Medicine Series.

(2) Therapeutic Gazette, June, 1913.

tions. He also employed the mild method as advocated by Petruschky, Ehrlich, Guttman and Goetsch, the object being to secure results without severe constitutional reactions, holding that this method possesses the following advantages:

By using the minutest doses reactions are avoided, and yet the highest and most potent doses may eventually be given.

It allows the severest forms of tuberculosis to be safely treated.

It allows the patient to carry other forms of treatment, and even to attend to his ordinary light duties whilst receiving the treatment.

Tuberculin is given for the purpose of producing toxic immunity and a local hypermia. Many of the subjective symptoms observed in tuberculosis are due to the absorption of toxins, and it is by no means uncommon to observe headache, loss of appetite, disturbed sleep, and general malaise to disappear after each injection of tuberculin. Many of the objective symptoms—such as fever, night sweats, quick pulse—yield to tuberculin, and when this treatment is associated with general life in a sanatorium the very best results are obtained.

Raw's dose is 1/100 of a milligramme of dried bacillary substance. On the other hand, he confesses that many of his patients whom he sent abroad to Switzerland, Germany and Austria have returned to him apparently recovered, having received enormous doses of tuberculin at the hands of continental physicians—in some cases even 20 milligrammes of dried bacillary bovine substance. As to the contra-indications, he states that putting aside the incurable forms, especially those of severe mixed infection with pyrexia or the generalized infections, practically every uncomplicated case of tuberculosis may be submitted to tuberculin treatment provided that we commence with minute doses and carefully watch the effect.

Fever rising to 101° F. at night is a contra-indication, and it is preferable to wait until the pyrexia is reduced before commencing tuberculin. Nor is it desirable to give the injections when there is a tendency to hemoptysis,

since it is probable that even in the lung a local reaction follows the treatment, and if hemorrhage is taking place at the seat of infection it is not wise to set up even the slightest local reaction. In the treatment of glands the remedy is particularly potent.

The beginning dose is 0.0001 mg. It is gradually increased with weekly repetitions until the final dose of 0.01 is reached, careful watch being kept for undue reaction as evidenced by fever. Especial attention is called to the need of being sure that there is no suppuration penned up in the body; otherwise the injection of tuberculin, by setting up a local activity in or near a tuberculous focus, may inadvertently liberate the bacilli and cause a general infection. All pus should therefore be liberated before any tuberculin is administered. As to whether the patient is going to be destroyed by tuberculosis, this is dependent on the virulence of tuberculosis and the individual's resistance. In many cases the disease shows little tendency to progress in the body, so that it may exist for twenty or thirty years without destroying life or producing great crippling. In other instances it kills in two or three weeks. It is particularly in the avirulent cases that the tuberculin is of great service. As to glandular infection, so common in children, this Raw regards as practically always of bovine origin incident to tuberculous milk, the first lodgment being in tonsils and carious teeth. As little as possible should be done with the knife. When one large gland is involved and there is evidence of caseation it should be evacuated; and in the case of general suppuration with extensive periadenitis, free incisions to liberate pus should be made.

Goetsch lays down the rule that tuberculin is to be given only when there is little fever, that the dose should not be increased until the previous amount is tolerated without any reaction. The patient must rest in bed before the injection and for twenty-four hours afterward. Of the 175 patients treated by Goetsch in the last ten years 125 (or 71 per cent.) have been cured, whilst the remaining 50 were improved. His cases were, however, all carefully selected and all in the early stage of the disease. The injection was given in a thoroughly

cleanly manner, usually on the outer side of the forearm. When, according to Raw, the maximum dose of 1/100 part of a milligramme is reached, or 0.01 mg., it is never exceeded, but continued for several weeks. As a rule, after the first two or three injections the patients feel better, the temperature drops to normal, the appetite is improved, and there is a feeling of general benefit. The special variety of tuberculin to be used must be determined by the nature of the infection with which we have to deal; and as nearly all cases of pulmonary tuberculosis or consumption are of human origin—that is, they are caused by the bacilli of the human type—it is necessary to use a tuberculin prepared from bacilli of the bovine type, this being less irritating and less likely to produce a reaction, and more complete immunity is produced by using tuberculin of the opposite type. It is further stated that the best treatment we can offer to-day is a prolonged open-air life, preferably in a well-conducted sanatorium, excess of nutritious food, gentle exercise followed by plenty of rest, and a course of tuberculin by a careful physician.

In this relation Rundle (ibid.) lays down the following laws for the use of tuberculin in pulmonary tuberculosis: When the temperature remains normal after a week's observation, begin tuberculin at once and increase the dosage rapidly. When the temperature rises to 99° or even 101° F. each day some of the most brilliant effects of tuberculin are seen. When the temperature is intermittent or markedly remittent, swinging through several degrees daily, pyrexia of this character suggests a superadded coccal infection which must be dealt with before a course of tuberculin is begun. Treatment by means of an autogenous vaccine prepared from the patient's sputum should hold out some prospect of success, but the isolation of the coccus at fault from sputum is obviously difficult and uncertain. Tuberculin is certainly of use in this type of case, but only when the secondary infection has been overcome. When there is a considerable rise of temperature which is constant or occasionally remittent, the use of tuberculin may be attended by disastrous consequences.

Grace-Calvert (ibid.) records 106 cases in which he has given tuberculin, and 4 of those have developed meningitis. He reports on 7 cases of this disease, all ending fatally, and observed that the clinical symptoms and signs in children are headache, vomiting, fever, backache, with optic neuritis and Kernig's sign. In the adult, the onset may be very insidious and be characterized by a change in mentality and power of concentration, together with headache. Indeed, a severe, persistent headache complicating any form of tuberculosis should always suggest the onset of meningitis. In optic neuritis, if Kernig's sign be present in addition, the diagnosis is almost certain. Fluid obtained by lumbar puncture will usually be strongly corroborative. There is an increase in quantity, it is slightly turbid, and contains an excess of lymphocytes. Usually tubercle bacilli are also found. In adults the disease seems to be invariably fatal. The duration is variable, and death may take place in a few days, or it may be delayed for several weeks. Headaches are relieved only by morphine. Spinal puncture sometimes seems helpful. This may be many times repeated. Small doses of tuberculin are suggested as theoretically advisable, repeated and increasing every third or fourth day, since it is important to produce an active immunity as soon as possible. In one case there seemed to be marked retrogression of symptoms under this method.

In regard to secondary infections in pulmonary tuberculosis, McLellan (ibid.) notes that with all our boasted modern methods it is only in isolated clinics that more than 60 per cent. of cases occur in which the disease is arrested, even though these cases exhibit only the early stage of the disease and are placed under the most favorable conditions as regards open air, etc.

The statistics of the intermediate and advanced cases are even more depressing. The report of the German sanatorium at Davos for the year 1910, after an average of 200 days' treatment, shows only 32.5 per cent. of class two lost the tubercle bacilli from the sputum; whilst in class three it was as low as 14.2.

The disappearance of the tubercle bacilli does not indi-

cate cure. It simply means that the patient has ceased to be infectious. The mortality in the four years following discharge from sanitaria has been found to be enormous. McLellan holds that a principal object of treatment is to prevent early or incipient cases, with no tubercle bacilli in the sputum, in which the infection is closed, from developing into open cases with sputum containing the bacilli; and to arrest the progress of the open cases and render them non-infectious. It is usually recognized that the majority of symptoms of advanced tuberculosis are not due to the bacillus itself, but to the secondary infection. The evidence of this secondary infection implies careful attention to the nasopharyngeal passages, and rest in bed, preferably with continuous antiseptic inhalations.

McLellan after pointing out the difficulties in regulating the vaccine treatment of secondary infection, advises preparation of a vaccine from the more virulent organism found. If this be unsuccessful he would go on with mixed vaccine. In any vaccine it is a good rule always to start with a very small dose, and this particularly applies to the more acute cases. He does not consider it wise to administer tuberculin until the secondary infection is controlled.

Alexander (ibid.) holds that vaccine treatment depends on the power of the patient to react to the immunizing stimulus, the identification of, and if possible, the preparation of the vaccine from the causal organism.

The correct dosage depends on the virulence of the organism and the reactivity of the patient's tissues. The observance of the correct interval between doses depends on the response to the dose, the interval and the dose being mutually interdependent.

Carnot recognizes three stages of blood infection. In the first stage the organism is shed from some focus—teeth, intestine, nose, or superficial wound—into the blood, causing a rigor, destruction of the bacteria, and clinically an acute but transitory headache and general malaise. In the second stage, the weaker organisms die out soon after entering the blood-stream, but the more

virulent individuals contrive to exist for some time. There is a preliminary rigor or shiver, and a later typhoid state which lasts from a few hours or days to a week or ten days, but clears up as the organisms eventually perish. In the third stage the organisms exist and develop in the blood. If the tissues are poisoned the bactericidal powers of the blood itself are depleted, and the picture now is identical with that of a septic endocarditis in its later stages. These three stages may succeed one another, with virulent infections in a period of hours or days. More usually they require months to produce a fatal result. In malaria it is recognized that a rigor signifies the incursion of sporulating parasites into the blood plasma. Malaria being ruled out a rigor always signifies an incursion of organisms or their toxins into the blood stream; if this were more generally recognized, malignant endocarditis would be diagnosed earlier.

The pneumococcus can be obtained by blood culture in true pneumonia early in the attack; by the same method the typhoid bacillus can be recovered, in the first week of the disease, from 96 per cent. of the cases, from 50 per cent. in the second week, and from 16 per cent. in the third week. The working bacteriologist does not attempt a blood culture with much hope of success if the temperature be under 101° F. Most cases with a persistent leucopenia in bacterial diseases—a condition produced always and only by the permanence of organisms in the circulating blood—terminate fatally. If the leucopenia alternates with the leucocytosis there is sufficient evidence of a tissue reaction, and a dose of vaccine may excite response. If the leucopenia is permanent and no fluctuations occur in any of the various types of white cells in relation to intermissions of temperature, the tissues are poisoned beyond hope. Alexander admits that staphylococcus aureus causes most boils and many cases of osteomyelitis, and that a stock vaccine produces quite excellent results in many of these cases. He also admits that gonococcus infections can be diagnosed clinically and that a stock gonococcal vaccine rarely produces any result. But, having admitted the possibility of correct clinical diagnosis in these two infections, there is no

other infection that can with safety and accuracy be diagnosed without the aid of bacteriological methods.

For instance, pneumonia is caused by the pneumococcus in only from 50 to 60 per cent. of cases clinically. Hence, in at least 40 per cent. of pneumonias a pneumococcus vaccine is useless. But pneumococcus vaccines are administered right and left in every case of so-called pneumonia even by mouth, and when no effect is produced the result is not attributed to ignorance, but to the utter worthlessness of vaccine therapy.

If the mistaken percentage in pneumonia is 40 per cent., the corresponding number for *B. coli* infections is at least 1,000 per cent.

Even with six tests formulated by McConkey, dependent mainly on the production of acid and gas in sugar media, there may be theoretically 200-odd varieties of the coli group, none of which are true *B. coli.* One hundred and fifty varieties have been isolated and described. If the polyvalent *B. coli* vaccine be prepared it contains ten strains of the manufacturer's idea of what *B. coli* ought to be. If a *B. coli* serum be employed, the animal which furnishes it has been immunized with not more than ten or a dozen strains. A blunderbuss was popular in the Georgian era because its orifice was wide and its pellets outnumbered the assailants at whom it was aimed. But the polyvalent vaccine fulfils none of these functions. Its pellets in the case of the coliform organisms are outnumbered by at least fifteen to one, and the 150 of the enemy remain unharmed. Although it is easy to obtain many strains of coli variants from the same case, it is difficult to determine which of the varieties isolated is the organism causing the symptoms. The task of preparing the vaccine from the important organism, which unfortunately is not invariably the predominant organism, is one of the most difficult falling to the lot of a bacteriologist.

Alexander summaries his observations, which have been quoted in full, to the effect that there is no such thing as a *B. coli* in human infections. The organisms which produce grave lesions in human beings form the brothers and sisters, cousins and second cousins, of the

original *B. coli*—Metschnikoff terms them the "wild races"—and it is unwise to speak of *B. coli,* but perfectly safe to speak of a coliform organism. In regard to the streptococci, the evidence agrees in respect to the existence of different species of streptococci, and this in itself is inimical to the production of beneficial results by stock vaccines. The position here is not, however, so utterly hopeless as the one described under the heading of *B. coli.* The individuals of the streptococcus group can not be so easily distinguished by chemcal tests as were the coliform organisms, though animal inoculations aid in their differentiation. Hence, a polyvalent streptococcus vaccine has an infinitely better chance of eliciting a beneficial response than any coli serum or vaccine. Streptococcus stock vaccines are rarely given, because there is a valuable serum prepared from this organism. It is used largely and promptly in early and late cases of clinical streptococcal infections. The percentage in which good results have been produced is small compared with the total number of cases so treated. It is not denied that stock vaccines of some organisms are useful, but of what use would they be to a man whose knowledge informs him that all pneumonias are pneumococcus, all appendicitis is due to *B. coli,* that there is only one streptococcus, and that the obscure cases require either "606" or tuberculin? Hence, vaccines are given to patients whose tissues are poisoned beyond all power of reaction, and the wrong stock vaccines are administered to those who are in a fit condition to benefit by the proper organism.

As to the correct dose, in the first place it is individual, and depends upon the reactivity of the patient and the virulence of the organism. Hence, all initial doses must be small. Effective doses are those which may produce a local reaction and may produce a general reaction, but do produce a focal reaction, slight or severe. The interval depends entirely on the focal reaction—this term meaning the disturbance at the seat of disease. Local signifies the reaction at the site of injection; general, such symptoms as headache, nausea, rise of temperature, numbness of extremities, etc. The local and the

general reactions are by-products. They usually run parallel with the focal reaction; but if they do not, they are to be disregarded in favor of the evidence furnished by the diseased spot itself.

It is the custom in vaccine therapy to administer doses which will carry the patient over into the following week. Occasionally doses are seen in which the maximum dose is obtained very early, and any increase produces disastrous effects. Successful results can only be obtained under such circumstances by gradually decreasing the intervals until finally a larger dose may be adventured. The motto of vaccine therapy is progression, and this may signify either increase in dose or diminution of the intervals, preferably increase of the dose, since it has been proven that diminution of interval is not so effective. The doses attained in the treatment of chronic cases are sometimes very large. A dose of 12000 million staphylococci (aureus) has been given to a patient at weekly intervals; in this case no improvement was seen until the 6000 million mark was reached. The chief errors which are perpetrated are the want of an early and accurate bacteriologic diagnosis, the use of stock vaccine in undiagnosed conditions, and the administration of vaccines without any regard for the reaction, the interval, and the progression of the patient's immunity.

Acne Vaccine.

Vaccine Treatment of Acne. Galbraith[3] deduces the following conclusions in regard to the vaccine treatment of acne:

The acne bacillus is the cause of acne in all its stages.

The staphylococcus is a surface contamination, and at the most can only aggravate existing pustulation.

Doses of from 5 to 10 millions do not suffice to cure, unless one is prepared to go on indefinitely. The doses required range from 30 to 100 millions, according to the type of the disease.

The duration of treatment extends from 3 to 5 months

(3) Practitioner, September, 1912.

in the milder cases, from 6 to 12 months in the severe forms.

As there is a close relation between the opsonic index and the amount of pustulation, the latter may be taken as the guide to dosage and frequency of administration.

Whilst it is impossible to give anything like a definite prognosis, it may be said that marked improvement is brought about in the great majority of cases and a fair proportion cured, and that it is a striking advance on the older methods of treatment. The mild comedo and superficial pustular type are most amenable to treatment, next the pure comedo type, and last the deep indurated type.

The author states that he has not found an autogenous vaccine give better results than a stock vaccine.

Tuberculin.

Uniform Method of Treatment With Tuberculin. It has generally been accepted that the method of treatment with tuberculin is the same at the dispensary as in the sanatorium, but this is not the case, says Thomson.[4] In the sanatorium, patients are under constant medical supervision, and the amount of muscular and respiratory activity is regulated according to the requirements of each individual case. In the sanatorium, treatment by auto-inoculation takes the place of the preliminary course of treatment with exotoxic tuberculin at the dispensary. Excellent results are obtained in a sanatorium by a course of tuberculin containing both endotoxin and exotoxin administered when patients have ceased to react to the maximum amount of walking exercise and manual labor; in other words, when a certain degree of tolerance to exotoxin has been secured.

At the dispensary, on the other hand, the muscular and respiratory movements of the patient are not under intelligent control. The patient is liable to show sensitiveness to auto-inoculation with the exotoxin of the bacillus, hence a degree of tolerance sufficient to steady the temperature must first of all be produced by a course of treatment with exotoxic tuberculin. The method of

(4) Brit. Med. Jour., May 3, 1913.

administration and frequency of dosage are a source of no little diversity of opinion. In Thomson's experience the most efficient and permanently beneficial focal result is obtained by inoculating the patient once a week and by gradually increasing the dose without the production of any marked focal reaction, 99° F. being regarded as the danger zone. If the doses are rapidly increased and reaction is ignored, a high degree of toxic tolerance may be obtained, but this is secured at the expense of tissue immunity, so that the last stage of the patient becomes worse than the first.

The following is the method of treatment with tuberculin which Thomson has adopted:

At the Dispensary: (a) A course of treatment with T. O. A. (exotoxic) until a certain degree of tolerance is produced. The following doses are given every eighth day:

0.00001 c.c., 0.00002 c.c., 0.00003 c.c., 0.00004 c.c., 0.00005 c.c., 0.000075 c.c., 0.0001 c.c., 0.0002 c.c., 0.0003 c.c., 0.0004 c.c., 0.0005 c.c., 0.00075 c.c., 0.001 c.c.

(b) When the dose of 0.01 c.c. has been reached, a course of treatment with new tuberculin W., which contains both endotoxin and exotoxin of the human bacillus, is commenced in the following doses:

Immediately following the 0.001 c.c., T. O. A., 0.00005 c.c., 0.000075 c.c., 0.0001 c.c., 0.0002 c.c., 0.0003 c.c., 0.0004 c.c., 0.0005 c.c., 0.00075 c.c., 0.001 c.c., 0.002 c.c., 0.003 c.c., 0.004 c.c., 0.005 c.c., 0.0075 c.c., 0.01 c.c., 0.02 c.c., 0.03 c.c., 0.04 c.c., 0.05 c.c., 0.075 c.c., 0.1 c.c. This is the maximum dose, and it is repeated at gradually increasing intervals.

The above course of treatment applies to well-marked types of the disease with evidence of slight phases of recurring or persistent auto-inoculation. Thomson has not found it necessary or desirable to go above the maximum dose of 0.1 c.c. of pure tuberculin.

In the Sanatorium: In the sanatorium a course of treatment with exotoxic tuberculin is replaced in the majority of cases with induced auto-inoculation. The patient with an active tuberculous focus is thus led from a period of rest through the various stages of induced

auto-inoculation to a full course of treatment with tuberculin containing both the endotoxin and exotoxin of the human bacillus. Part of this course will be commenced at the sanatorium, but it will usually be completed at the dispensary. Thomson recommends in the sanatorium a course of new tuberculin W. in the following doses:

0.00001 c.c., 0.00002 c.c., 0.00003 c.c., 0.00004 c.c., 0.00005 c.c., 0.000075 c.c., 0.0001 c.c., 0.0002 c.c., 0.0003 c.c., 0.0004 c.c., 0.0005 c.c., 0.00075 c.c., 0.001 c.c., 0.002 c.c., 0.003 c.c., 0.004 cc., 0.005 c.c., 0.0075 c.c., 0.01 c.c., 0.02 c.c., 0.03 c.c., 0.04 c.c., 0.05 c.c., 0.075 c.c., 0.1 c.c., the maximum dose to be repeated at gradually increasing intervals.

Diagnostic and Therapeutic Value of a New Form of Tuberculin. It is believed by Lyons[5] that old tuberculin contains some substance which produces a positive reaction, perhaps by irritation, on apparently healthy individuals, and that if that substance be removed a positive reaction will more definitely indicate the presence of tuberculous disease.

On adding to 10 c.c. of old tuberculin 60 c.c. of absolute alcohol a cloudiness appears in the solution, which on standing for 24 hours settles as a precipitate. The supernatant liquid is again precipitated with absolute alcohol and filtered. The precipitate from both precipitations is dissolved in 10 c.c. of distilled water. This solution is again precipitated and filtered; the filtrate obtained from this is added to the first filtrate, and the whole evaporated to its original bulk (10 c.c.) at a temperature of 56° C.

It is then diluted with distilled water to form a 10 per cent. solution. If 1 minim of this solution be injected under the horny layer of the skin, a raised inflammatory area appears round the site of injection in from 12 to 18 hours in known tuberculous individuals, but no positive reaction has been noted by the author in persons apparently free from tuberculous disease, such individuals being likewise free, according to their clinical histories, from any suspicion of tuberculous affection.

(5) Lancet, Dec. 7, 1912.

In early cases, the reaction persists for 3 or 4 days, while in advanced cases it passes off in from 24 to 48 hours. The test was applied to 270 persons. Among 191 tuberculous individuals the reaction was positive in 186; the remaining 5 were in the last stages of pulmonary tuberculosis and died within two weeks. In the other 79 negative cases no reaction whatever was noted, and in these great care was taken to exclude the possibility of a tuberculous infection, past or present. The reaction has proved of great value in the diagnosis of medical and surgical cases of tuberculosis, especially in cases of incipient phthisis otherwise in doubt.

A number of patients were also treated with filtrate (for convenience termed T. F.), with encouraging results. The initial dose found to be most convenient is 0.001 c.c. This is increased every other day by from 0.0002 c.c. to 0.001 c.c., according to the reaction produced. It is easily borne and does not produce untoward results so frequently given by other forms of tuberculin.

The supraspinous fossæ were used alternately for the injections, which were given deeply into the muscles every other day. Thirty cases of pulmonary tuberculosis thus treated for two months have all benefited thereby, as shown by a fall of temperature, increase in weight, disappearance or diminution of the moist sounds in the chest, and the cough, as well as a subjective feeling of well-being.

Diagnostic Value of Tuberculin. N. D. Bardswell[6] states that in healthy persons the tuberculin reaction is of no clinical significance, and that in a case of ill-health a reaction to tuberculin is, in itself, no evidence that tuberculosis is the cause of the symptoms. In brief, it is generally recognized that so far as pulmonary tuberculosis is concerned tuberculin for diagnostic purposes has great limitations, since a reaction occurs as readily in cases of mere infection with tuberculosis (non-clinical tuberculosis) as in clinical tuberculosis, and in respect to clinical tuberculosis we are unable to differentiate with any certainty by the use of tuberculin between cases of active, quiescent, and arrested disease. There

(6) Lancet, June 7, 1913.

are, nowever, good grounds for holding that in the case of a patient presenting indefinite signs and symptoms the failure to react to a subcutaneous dose of 10 milligrams is strong evidence against the occurrence of a focal reaction in a suspected area in the lungs suggestive of the existence of potentially active tuberculous disease.

Treatment of Pulmonary Tuberculosis With Small Doses of Tuberculin. Bardswell[7] makes a report on this subject.

1. *Immediate Results.* In the case of all the patients thus treated the injection of the small dose of tuberculin almost invariably resulted in a satisfactory immunizing response, as shown by the rise in the opsonic index. The repeated immunizing responses were not, however, associated with any appreciable alteration in the clinical condition, in respect to such essential factors as reduction of temperature, diminution in the amount of sputum, disappearance of the tubercle bacilli, etc. The writer was indeed unable to detect any difference whatever in the progress of the tuberculin-treated patients as compared with the progress of similar types of patients who, living under precisely similar conditions, were not having tuberculin. It is of some interest to note that in no case did the weekly repetition of the small doses of tuberculin give rise to any hypersensitization.

2. *Ultimate Results.* Considering only the 17 patients whose treatment extended over periods ranging from a minimum of 7 weeks to a maximum of 25 weeks, the results are as follows: Of 12 cases of moderately advanced disease, after a period of 5 years since discharge from the sanatorium, 4, or 33 per cent., are well, and the remainder are dead. Of those who have died, 2 lived for over 4 years, 3 lived for over 3 years, 2 lived for over one year, and one lived 3 months only after discharge. Two of the 4 patients who are well lost their bacilli before they left the sanatorium. In the 5 cases of very advanced disease all the patients died within 12 months of their discharge.

(7) Lancet, Jan. 4, 1913.

These results, as a matter of fact, compare somewhat unfavorably with the ultimate results of comparable cases treated in the sanatorium during the same period without tuberculin. The numbers treated with tuberculin, however, are small, so no great importance can be attached to such a statistical comparison.

The conclusion he thinks he is justified in arriving at is that the tuberculin, from a clinical point of view, was a negligible factor, and in no wise influenced either the immediate or the ultimate prospects of the patients to whom it was given.

Tuberculin in Pulmonary Tuberculosis. Bermann[8] gives a detailed report of seven typical cases in which tuberculin was systematically used, emphasizing the important aid it afforded when the system was still capable of the slight stimulating reaction which alone renders tuberculin effectual. He advises against permitting any evident clinical reaction, keeping the doses, concentration and intervals at the point below that of inducing a clinical reaction. The tuberculin is most effectual in the incipient cases and in those with a torpid evolution or standing still, without fever, and the general condition still good. There need be no fear of untoward by-effects in these classes of cases. It is of great assistance to have the patient prepared by a course of hygiene and dieting before starting the tuberculin; the best results are attained when the patient can have the benefit of sanatorium treatment with the tuberculin; when this is not possible the physician must be stricter in picking out cases in which to give the patient the benefit of the tuberculin.

Individualizing the Dose of Tuberculin in Pulmonary Tuberculosis. Tillisch[9] gives the minute details of his method of individualizing the dosage to ensure the maximum immunity to the toxin and local reaction without injury to the organism as a whole. He has frequently witnessed the subsidence under tuberculin treatment of old rheumatic pains, which he thinks testifies that these supposed rheumatic affections are in reality the work

(8) Semana Méd., April 24, 1913.
(9) Norsk Mag. f. Laegevidensk., June, 1913.

of the tuberculous toxins. Dyspepsia is also liable to disappear in the same way. In one case of subfebrile phthisis which had dragged along for a few years with digestive disturbances and loss of appetite, conditions in these respects returned to normal during the tuberculin treatment. Then the tuberculin was suspended for a time and the temperature ran up again and the dyspepsia returned, all subsiding again on resumption of the tuberculin. These favorable results are directly dependent on proper dosage, neither too much nor too little. Tuberculin treatment is of no use, he thinks, in acute tuberculosis; the body is already flooded with substances of this nature, and it is worse than folly to add to the amount, as also in disseminated tuberculosis with much exudation and numerous large foci in the lungs. The temperature in such cases is very unstable, while the susceptibility to tuberculin is extremely high. The field of tuberculin treatment is in the more torpid forms in which the process seems nearly stationary from month to month. In the incipient cases which are not very favorably influenced by sanatorium treatment, he has found a course of tuberculin often evidently the one thing needed to complete the cure. In the cases of masked tuberculosis also, tuberculin treatment may prove of the greatest benefit. Of his 91 patients given systematic tuberculin treatment, 18 in the first, 36 in the second stage and 37 in the third, and over 50 per cent. lost the bacilli from the sputum, including 7 of the 9 in the first stage, 17 of the 27 in the second stage, and 10 of the 34 in the third stage. Eight patients were given prolonged dispensary tuberculin treatment while keeping at work all the time after a course of sanatorium treatment. All now are clinically cured. This, he declares, is the most fruitful field for tuberculin treatment—one or two injections a month systematically kept up after a fresh-air course. He warns decidedly against dispensary tuberculin treatment from the first without the preliminary sanatorium experience.

Hypersensitiveness to Tuberculo-Protein and Tuberculin. Austrian's[1] experiments confirm the already

(1) Bull. Johns Hopkins Hosp., May, 1913.

demonstrated facts that (1) a protein substance can be obtained by the extraction of tubercle bacilli with water, and with it animals can be actively sensitized, (2) that a refractory condition to this protein can be produced, and (3) that the hypersensitive condition is transmitted from mother to young. His experiments establish further that active sensitization induced by treatment with this protein may be as regular in its development and as intense in its manifestations as is that produced by treatment with the other proteins. Passive homologous and heterologous hypersensitiveness can occasionally be produced with the blood or with the serum of an actively sensitized animal. The material transmission of the hypersensitiveness does not take place through the milk. The regularity with which maximum hypersensitiveness can be produced is largely dependent on the use of a sufficient amount of protein in preparing and testing the animals. All the manifestations of typical hypersensitiveness to protein can be produced in guinea-pigs by treatment with aqueous extracts of tubercle bacilli. Guinea-pigs can be sensitized with albumose-free tuberculin and with old tuberculin that has been freed of glycerine and made poor in salts. And sensitization with any of these products causes the animal to react to injections of the others.

Hypersensitiveness to tuberculin develops within from 7 to 15 days after infection with the *B. tuberculosis*. Tuberculous animals can occasionally be intoxicated with tuberculo-protein, developing symptoms of hypersensitiveness. The passive transference of hypersensitiveness from a tuberculous man to normal guinea-pigs has been successfully accomplished by Austrian, and positive results have likewise been obtained when the serum of a sensitized animal has been injected into an untreated one. The type of the reaction symptoms and the development of them in an infected host after the administration of minimum doses of tuberculin are likewise suggestive facts. Austrian is of the opinion that this evidence justifies the interpretation of the tuberculin reaction as a manifestation of true hypersensitiveness.

Skin Tuberculin Test Technic as Therapeutic Measure for Tuberculous Lymph Nodes. Koeppe[2] noticed in giving von Pirquet's test that the enlarged axillary glands on the side of the test frequently decreased in size, while those on the other side were unmodified. He concluded that the tuberculin, entering the lymph spaces, is carried to the lymph nodes, where it exerts a direct curative effect. He describes a striking case which confirmed this view. A child of 4½ years was brought to the hospital in an emaciated cachectic state—chest flat, breathing shallow, no physical signs in the lungs; in the right axilla swollen lymph nodes, as large as the fist; the lymph nodes along the sternomastoid were also swollen. The lymph nodes were hard, with no trace of fluctuation. The v. Pirquet test was strongly positive. Four days later there was a pustule at the site of the test inoculation, surrounded by small vessels. Unexpectedly the child began to improve, and the axillary lymph nodes to decrease in size. Another v. Pirquet test was given, with continued improvement, but the neck glands did not decrease, and then the test was given just back of the ear, as the lymph passages of this region communicated directly with the neck lymph nodes. Decrease in the size of these nodes immediately followed. The general health and the local condition continued to improve, and at present—four years later—the child is well. Other cases have been treated in the same way since with good results, and Koeppe recommends it as a therapeutic measure in all cases in which the lymph nodes are swollen and hard and the v. Pirquet reaction is strongly positive.

[This method is not new. In 1908 I saw Jagic using it in Noorden's clinic in Vienna for early pulmonary tuberculosis, and, as he claimed, with good results.—Ed.]

Tuberculin in Genito-Urinary Tuberculosis. Inasmuch as tuberculosis of the urogenital tract differs very little from tuberculous infections located elsewhere in the body, Coleman[3] says that it would be useless to out-

(2) Zeitschr. f. Kinderheilk.
(3) Ohio State Med. Jour., May, 1913.

line what cases should not receive tuberculin injections, except that one must differentiate between operable and inoperable cases. The pathologic changes must be considered, whether extremely acute or actively progressive, also, the general condition of the patient. If there is a persistent temperature of over 100° F., night sweats, chronic diarrhea, progressive loss of weight and extensive involvement of tissue, tuberculin injections are contra-indicated. In administering tuberculin Coleman considers it a very good rule to continue the entire course of treatment without changing the source of supply, as he has found that two concentrated solutions having the same strength or standardization but from different manufacturers varied in specific gravity, color and physical properties. He also prefers to give the injections subcutaneously, between the scapulæ.

Dilutions are made up fresh each day, using 0.5 per cent. phenol as diluent. He begins with a minimum dose of 1 c.c. of one-one-hundred thousandth dilution and increases the dose 1 c.c. each following injection until a reaction is evident. Injections are given every fifth day unless a prolongation of temperature ensues or increased local or general reaction. After reaction is manifest, that is, rise in temperature not to exceed two degrees above temperature of patient before injection, no increase of dose is made until the reaction inducing dose has been twice repeated without producing a rise of temperature, so that in each injection that again induces reaction, the dose must be tolerated twice before further increase is attempted. The maximum limit is regulated according to the necessity of the case. He says: Do not stop injection until long after all symptoms have subsided; also, do not discontinue the injections of tuberculin too suddenly, as rather severe relapses may follow. All other lines of treatment must be used in conjunction with tuberculin therapy. Proper hygiene, in the way of an out-of-door life, fat-producing foods, rest and everything that will aid in restoring health are absolutely essential.

Coleman reports 3 cases and has had under observation during the past eighteen months 20 additional cases,

as follows: 14 cases of tuberculosis of kidney, 13 being unilateral and one bilateral; 10 of them operable, 4 inoperable (3 of the latter due to extensive pulmonary involvement and one due to both kidneys being affected); 6 cases of tuberculosis of epididymis, 2 men being operated on; 3 cases of early infection, one inoperable, due to extensive pulmonary involvement. Fifteen of these patients have received tuberculin injections with the following results: 28 per cent. apparently cured, 49 per cent. improved, 12 per cent. unimproved, 11 per cent. not under treatment sufficient time to draw conclusion.

He summarizes his views as follows: There is no spontaneous cure for tuberculosis of the kidney. Tuberculin will not cure, but will be a valuable adjunct combined with other methods of treatment. Operable cases of renal tuberculosis are not suited to tuberculin injections, but early cases, in which we can positively find tubercle bacilli without suppuration or impairment of the functional activity of the kidney, are suited to treatment by tuberculin until such time as symptoms present indications for nephrectomy. Tuberculin treatment certainly is worthy of recommendation in cases of renal tuberculosis following nephrectomy when morbid foci still remain in the urinary tract or in other organs. Early involvement of the lower genital tract is certainly improved by tuberculin therapy, although any influence exerted on the morbid focus in the sense of a cure has not been demonstrated. Inoperable cases are scarcely influenced by tuberculin, but in the absence of other therapeutic means it may be tried; also certain isolated cases will not respond to a reaction of tuberculin and may therefore be carried on without injury to the patient. Tuberculin should not be employed promiscuously as a matter of experiment. If the physician does not possess a definite knowledge of the physiologic action of tuberculin, the treatment is purely empirical. He must not think that he can follow the directions given out by manufacturers relative to the regulation of dosage, or depend on the serial dilutions as a method of standardization. If he does, his results will certainly be

far from satisfactory. The patient must be closely observed, results accurately tabulated, the effects of a regulated administration of tuberculin noted, and from such histories much valuable information can be obtained.

Typhoid Vaccine.

Tuberculin-Like Action of Antityphoid Vaccine. Vincent[4] has shown that antityphoid vaccine acts like tuberculin in stimulating latent or quiescent lesions into the active stage. The medical profession should hold the matter of compulsory vaccination in civil life sub judice. The surgeon-general of the army reports a striking case in which pulmonary tuberculosis manifested itself in very active form immediately following vaccination, its existence in latent form not having been suspected. It is true that over 100,000 immunizations have been made in the army and that this case was the only one in which noteworthy features manifested themselves, yet it must be remembered that soldiers are picked men who lead an out-of-door life and are not to be compared with civilians as regards liability to latent or active tuberculosis. Antityphoid vaccination is justifiable in the army, especially when the fact is borne in mind that typhoid fever is the scourge of camp life; but in civil life the conditions are such as to inspire the need of greater reserve. English and American observers have reported as much as from 2 to 4 per cent. of severe reactions, while the general mortality of typhoid fever in the United States is 29.5 per 100,000, or less than one-thirtieth of 1 per cent. In other words, to protect 30 individuals in 100,000 from death by typhoid fever by vaccination we would have to expose 2,000 to 4,000 of them to the possibility of stimulating into activity dormant or latent tuberculosis! While the latter disease would doubtless develop in but a small proportion of those exposed, the fact remains that great prudence is in order when the use of antityphoid vaccine in civil life—which includes a multitude of overworked and underfed individuals who labor in sweatshops, mills and other foci of tuberculous infection—is advocated.

(4) New York Med. Jour., May 3, 1913.

Possible Contra-indications for Antityphoid Vaccines. The *Interstate Medical Journal* has this critical statement to make on this topic:

There is increasing evidence that the injection into our bodies of dead pathogenic bacilli of any kind will cause an immunity against living bacilli of the same species. Although these facts have been known for nearly 25 years, no one knows as yet how long the immunity will last, but every one has hoped that it would be long enough to put the discovery to practical use in times of epidemics. In Asia, most attention has been given to the prevention of plague, cholera, and bacillary dysentery by this method, while in America and Europe typhoid fever has been the object of attack. The results reported so far are exceedingly favorable; but the medical profession, remembering the sad history of tuberculin when it was given in large fatal doses, has hesitated in adopting the new prophylactic method. This caution was wise, for it has been reported by Spooner that typhoid vaccine has had the effect of activating non-typhoidal disease which was latent or chronic at the time of the injection. Combe and Louis, of Paris, also report that considerable care must be exercised to exclude other diseases before vaccination for typhoid is undertaken. They lay special stress on the contra-indication for the use of typhoid vaccines, claiming that antityphoid vaccination ought not to be performed except in perfectly healthy subjects. Any acute affection, even the minor infections, such as sore throat, pains in the limbs, influenza, enteritis, stomach troubles with fever, coryza, bronchial and pulmonary affections, acute gonorrhea, primary and secondary syphilis, are sufficient to exclude its use. Most chronic affections are more important as possible contra-indications.

Special attention should be paid to the suspected tuberculous individual who, if inoculated with typhoid vaccine, may have a constitutional reaction with a rise of temperature, lasting for several days. This is really the fever of tuberculosis, the injection of typhoid antigen thus producing the same effect as tuberculin. An abnormal reaction in a subject who does not present any

obvious trace of this disease, in the absence of a previous attack of typhoid, according to these authors, must be suspected of latent tuberculosis.

In individuals with a history of past tuberculosis, though apparently cured, and in whom the general health is satisfactory, antityphoid vaccination, if required, should be given cautiously—five injections instead of four, in the following doses: 0.25 c.c., 0.5 c.c., 1 c.c., 1.5 c.c., and 2 c.c.; 0.25 c.c. is given to begin with in order to estimate the susceptibility of the individual. After giving this first injection the patient should be instructed to take his temperature; and, if the constitutional reaction that follows is at all marked, it is preferable to discontinue the vaccination. Combe and Louis claim that malarial subjects may undergo the treatment in the intervals between the attacks. However, it is necessary to give them 15 grains of muriate of quinine with each injection, 7 hours before the usual time for the onset of the attack. Failing this precaution, the injection of vaccine acts as would a chill, a fatigue, or an injury, *viz.*, it may awaken a malaria which is dormant and bring on the attack. Inactive syphilitic subjects who are not debilitated bear no contra-indications to this vaccination.

Cachexia from any cause, organic heart or kidney disease, diabetes, mucous colitis, are held as contra-indications. The vaccine is reported as producing albumin in the urine, but this same effect is produced, without harm to the patient, by the injection of any alien albumin.

In females during the menses and in debilitated, exhausted, fatigued subjects, vaccination had better be postponed to a later date and proceeded with as soon as the general health is judged satisfactory.

Prophylactic Value of Vaccines in Typhoid Fever. Dr. J. Clement Clark[5] says that, since 1903, the Springfield Hospital for the Insane in Sykesville, Maryland, each autumn cared for from 10 to 20 cases of typhoid fever among patients and nurses.

In June, 1911, after consultation with the State Board of Health, it was decided to employ antityphoid vacci-

(5) Maryland Med. Jour., January, 1913.

nation. Accordingly, all patients were inoculated, both male and female, except those immune from previous attacks and those suffering from tuberculosis or diseases of the vascular system and kidneys, together with several of the physicians, nurses and employees, in all 890.

Each injection was followed by local reaction, consisting of redness and swelling of variable degree, disappearing in about 12 hours. The general reaction was slight, and consisted in malaise, headache, backache, and slight fever, like the initial symptoms of typhoid fever. In only two cases did the temperature rise to over 100° F., and these proved to be unsuspected cases of tuberculosis. The injections were made in the afternoon, the patients thus resting all night, and nearly all were ready for breakfast the next morning. The reactions after each of the three injections were the same.

Not a single case of typhoid developed among the inoculated during the summer and fall, although one nurse who refused vaccination, one male attendant who was employed after the vaccinations, and one patient who entered the hospital after the vaccination contracted the disease, thus showing that the bacilli were somewhere around.

Early in June, 1912, all patients admitted during the year since the last vaccination of 1911 were vaccinated. In all there were 1316 inoculations among the patients and employees without a single abscess or any untoward after-effect. There has been but one case of typhoid in the hospital during the summer or fall of 1912, and this was in a patient who had not been vaccinated.

Vaccination of a Community Against Typhoid. H. Vincent[6] relates what he thinks are the first experiences in any country of wholesale vaccination of an entire community after the outbreak of an epidemic of typhoid. A hundred cases developed in two months at Paimpol, a town of 2,800 inhabitants, and a vigorous campaign of vaccination was at once started, vaccinating all the young people and young women as the most liable to contract the disease. None of the 400 vaccinated contracted it and not another case developed as soon as the

(6) Bull. de l'Acad. de Méd., May 20, 1913.

receptive part of the population had been given the third injection. Two families refused to be vaccinated and in each there was a case afterward; then one of the families had all the members vaccinated and had no further cases, while four more members of the family which still refused the vaccination came down with typhoid. In another town where typhoid was raging, the mayor called a mass meeting and told the citizens of the advantages of being vaccinated, and nearly every one present asked for it. Excluding the sick, the aged and those who had already had typhoid, nearly the entire population was vaccinated and the epidemic died out at once. When persons already in the clutches of typhoid were vaccinated, the disease ran an exceptionally mild course. The number thus vaccinated in the two towns was 712 out of a total civilian population of 3,500.

MISCELLANEOUS VACCINES.

Vaccine Treatment of Common Colds. Fisher[7] states that colds can be largely prevented by the reasonable isolation of every case, and preventive inoculation. Colds can be aborted or their course shortened by vaccine treatment. The treatment of acute and chronic inflammation of the respiratory tract by vaccines is specific. A symptom complex resembling influenza may be due to other organisms. While bacterins are invaluable in the treatment of acute and chronic infections of the nose and respiratory tract, and are attended with almost constant success, it is as a prophylactic that they give most brilliant results. The immunity occasionally lasts a year or more, but usually from 4 to 6 months is the average duration. To the individuals subject to recurrent colds, as many are during the winter months, it proves a great boon. In these cases it is well to make an autogenous vaccine from the first cold, to which may be added, if so desired, the other "cold germs" from stock. This may be given in increasing dosage with seven-day intervals, until from 4 to 6 doses are administered, which generally produce sufficient immunity for several months. If one prefers to wait until the onset

(7) Boston Med. and Surg. Jour., June 5, 1913.

of the next cold before beginning the treatment, the attack can almost invariably be aborted and immunity completed. This procedure may be repeated at the end of 6 months, or delayed until such time as necessity demands. The dosage which seems to give the best results is as follows: Pneumococcus, *M. catarrhalis, M. tetragenus,* each 125,000,000; streptococcus, 50,000,000; *B. influenzæ, B. septus, B. Friedlander,* about 100,000,000; staphylococcus, 400,000,000 to 800,000,000. The vaccine should be prepared so that eight minims contain the requisite number of sterile germs, as larger amounts of fluid are more apt to produce local reactions. The best site of inoculation is deep in the deltoid muscle.

Vaccine in Catarrh. As tuberculin is such a powerful proteid poison, Stevenson[8] believes it would be well in many cases to commence its use by taking it first by mouth. He has found that it can be carried to a dose that may be one thousand times as strong as it would be safe to use subcutaneously. He has the patient brush his teeth every morning and the dose of tuberculin is largely absorbed in the mouth. From there it probably passes directly into the lymphatic system. One man who had tuberculous laryngitis was apparently cured by this method, likewise two brothers with tuberculous suppurative otitis media. Excellent results have also been obtained in tuberculous chorioiditis. With the use of a catarrhal vaccine, at least 7 per cent. of Stevenson's patients had remarkable relief which could not have been obtained under other treatment. Acute coryza, chronic rhinitis with sinus involvements and extension to the trachea and bronchial tubes, tonsillitis and mastoid inflammations were often favorably controlled. There were no signs of hypersensitiveness created, as vaccines are free from the disturbances caused by serum anaphylaxis. It is especially useful in nasal infection with asthmatic complication. He has had several cases entirely relieved.

Vaccines in Treatment of Chronic Bronchitis and of Asthma. J. H. Harvey Pirie[9] has treated 16 cases of

(8) Indiana State Med. Ass'n. Jour., June, 1913.
(9) Brit. Med. Jour., June 14, 1913.

the former condition with autogenous vaccines made from the sputum, and containing all of the probably pathogenic organisms present. The most commonly found organisms are the pneumococcus, *Micrococcus catarrhalis* group, streptococci, and staphylococci. Attention is called to the necessity for the inclusion in the vaccine of colonies of each of the several strains of the *Micrococcus catarrhalis* group which are usually found, as many of the strains are non-pathogenic, and the selection of the one which is offending is impossible bacteriologically. Seven of his 16 patients are almost cured, 4 showed marked improvement, 4 slight improvement, and one no improvement. In asthma the same varieties of organisms were found as in bronchitis, but in the former the pneumococcus was found in every case, while in the bronchitis cases 2 of the 16 showed no pneumococci. Of 9 patients with asthma, 2 have been practically cured, 5 considerably improved, one shows slight improvement, and one, none.

Results of Bacterial Vaccine in Renal Calculus and Its Sequels. Ohlmacher[1] says that conclusive deductions as to the value of bacterial vaccine therapy in the sequels of nephrolithiasis can not be drawn from the cases he records. Their number is necessarily small, though they comprise all the patients with this particular affliction who came to Ohlmacher in the course of a routine private special practice devoted to therapeutic immunization with bacterial vaccines as directed to infections generally. But as would naturally be supposed, these cases were all scrutinized from the point of view of their bacteriology, with operative measures either not indicated, or already prosecuted without affording relief, and with the failure of various kinds of internal medication and local treatment, it was quite natural that he should have tested the therapeutic effect of inoculations with autogenous bacterial vaccines.

From the point of view of symptomatic relief, especially in the matter of distressful micturition and the accompanying failure of general health, he has been most favorably impressed by his experience in treating

(1) Jour. Amer. Med. Ass'n., April 19, 1913.

the sequels of renal calculus by the method of autogenous vaccine therapy.

That therapeutic inoculations of bacterial vaccines will in any way modify the production of urinary calculi is an open question. And, of course, it is almost superfluous to add that this mode of therapy in no way alters the matter of surgical intervention in those cases in which the operative indication, in the light of expert surgical judgment, is clear.

Whether bacteriuria can be abolished by the prolonged use of bacterial vaccines of autogenous origin is also undetermined, though the available evidence suggests that such an achievement would be the exception. In several of his cases the patients considered themselves well and did not return so as to permit a final bacteriologic analysis; but in the various subsequent examinations he still found the offending bacteria in the urine, though usually in greatly reduced numbers, even when a perfect symptomatic recovery had been achieved. It is especially on this account, he believes, that a conservative attitude should be maintained relative to the possibility of preventing nephrolithiasis by bacterial vaccine treatment.

Vaccination With Living Microörganisms in Gonorrhea. Broughton-Alcock[2] describes the clinical observations and results from the vaccination of 150 patients as a curative method of treatment. In 26 cases of uncomplicated acute gonorrheal urethral discharge treated he has but once seen the discharge cease and fail to show any gonococci during three or four weeks. He does not attach any value to this result. He has tried in various doses autogenous, non-autogenous and polyvalent living sensitized vaccines. To one patient he gave 100,000,000 non-sensitized living gonococci from a 24 hours' culture direct from a urethral discharge. There followed no good effect, no local or general reaction. Broughton-Alcock also tried the associated vaccination of living sensitized staphylococci albi (E) and streptococci cultures from a discharge, but these also failed to ameliorate the condition. No other treatment than that

(2) Lancet, April 26, 1913.

by vaccination was employed. He also adds that no patient who was treated suffered from any extension of the infection or complication.

The cases of discharge with complications are divided into two categories: (a) orchitis and epididymitis; (b) rheumatism, tendovaginitis, periarthritis, exudative arthritis. In all, 25 patients were treated. In section (a) the results were most satisfactory. Most patients were free from pain after the first injection; a few needed two. The 2 remaining patients were not free from pain until the third was given—all within a week. The large dose seemed to give the quicker relief. It took about three weeks to reduce the infiltration to the size of a pea, a nodule remaining in the globus minor. There were 2 cases of relapse, both apparently due to prolonging the interval, for rapid amelioration followed the next injection. Broughton-Alcock saw no relation between rapidity of relief and the previous duration of the infection. In section (b) there were 4 cases. After the first injection and within 48 hours acutely inflamed joints that one could barely touch, in one case of 15 days' duration, were freely movable without pain. The exudation disappeared in 3 days. Vertebral pain and painful non-suppurating ganglions were also rapidly relieved by the first injection. The cure persisted when patients were seen one month later. The only instances in which there was not complete relief within a week were those of subacute tendovaginitis without exudation. They necessitated at least one to three weeks' injection treatment.

Broughton-Alcock's impression from experience is that great value lies in big doses, and that sensitized gonococci rapidly produce or stimulate a body reaction. He could start with a dose of 500 to 3,000 million sensitized gonococci without a very severe local or general reaction, and the doses could be augmented or similar injections given beneficially within 72 hours. Up to the present time he has seen no advantage of the living sensitized gonococci over those allowed to die, and the preparation and injection require very delicate technic. Assured that the microörganism is adequately sensitized, Broughton-Alcock found a safe and beneficial procedure

is to commence with 20,000,000 staphylococci or streptococci and 200,000,000 gonococci (dead), and to augment rapidly and as high as indicated, basing the injections on reaction, local or general, for the two are not necessarily associated. The vaccines may be repeated every second day. A persistent local reaction does not indicate cessation, but only the need to go slowly, increasing the dose. Though not absolutely necessary to continue when, for example, a case appears cured after two or three injections, he has found it a much safer principle never to give less than six injections. Acute cases have done better with higher and daily doses. Broughton-Alcock prefers all vaccines in ½ c.c. of 0.8 per cent. saline. He has antistreptococcus, antistaphylococcus and antigonococcus serums prepared with many respective strains, and he keeps the sensitized virus vaccines of several strains in their "mother solution," applying them as indicated. All sub-cultures are kept going, the streptococci strains being based on Gordon's classification. Gonococcus vaccines are now always polyvalent.

Vaccines in Gonorrhea. The complement-fixation test in gonorrheal infections McDonagh and Klein[3] regard as a valuable aid to diagnosis. It can be used for regulating vaccine treatment. If the disease is in the latent stage and the body has need to form antibodies, the result of an injection of potent vaccine will be to stimulate their production. If antibodies are already present, the injection of vaccine in sufficient amount will temporarily neutralize or inhibit the same. The antibodies in such cases serve, apparently, to maintain the health of the body as a whole, without being adequate to destroy completely the foci of infection. The new formation of antibodies, following on their temporary disappearance, probably differs in some way which is not yet explained. The injection of a potent vaccine promotes a new artificial kind of immunity more effectual than that already established in the infected individual. Of the three methods of vaccine treatment tried, the intravenous autolyzed solution comes midway in its therapeutic action between an ordinary vaccine and a sensitized vaccine—

(3) Jour. of Path. and Bact., April, 1913.

both the latter being given subcutaneously or intramuscularly. The vaccine sensitized with a human antigonococcus serum is far superior to the vaccine sensitized with immune horse serum. Vaccine treatment, provided it is only supplementary to the right local and general treatment, is in many cases necessary before a cure can be obtained.

Vaccines in Pneumonia. The series of cases which Bispham[4] reports comprised 19 cases, with 2 deaths. Six patients were treated symptomatically, with 2 deaths, and in 13 patients vaccine was administered, with no deaths. No selection of cases was made, but the patients treated medically were those first occurring, and as soon as the vaccine was obtained all others were inoculated. The severity of the cases throughout the epidemic was about the same, the first few not being more serious than the others. The vaccine first used was prepared at the Army Medical School and subsequently a stock vaccine was used. No attempt was made to obtain autogenous vaccine, as the heterogenous variety was so satisfactory. The treatment should begin as early as a diagnosis is made. Where delay occurs, the success of the treatment is not so immediate and not so complete. The dosage is regulated on a sliding scale. An injection of 50 million bacteria is, in most cases, sufficient as an initial dose, but some sthenic cases will respond more favorably to larger doses up to possibly 150 million. All subsequent injections should be increased rapidly, giving 100 million on the second day, 200 million on the third, etc. The clinical picture of the patient should regulate, however, the amount used, and to err on the side of excess is as detrimental as to give too little.

Vaccines in Eye Infections. James Garfield Dwyer[5] published in 1910 the results he had obtained from vaccine treatment in a series of infections of the eye, ear, nose, and throat; since then the series has grown to over 300, and time has strengthened his conclusion that in vaccines, properly used, we have an agent that has no equal in certain cases. Of 27 patients with recurrent

(4) Military Surg., June, 1913.
(5) Arch. Ophth., May, 1913.

hordeola, 24 have been free from the attacks since treatment, one did not seem to improve at all, and 2 are still under treatment. The *Staphylococcus aureus* was found in the majority; some contained the *S. albus,* and a few the *S. citrus.* Autogenous vaccines were used in all. The series was limited to cases that had lasted for years, and the recurring hordeola appeared to be small local foci of suppuration, due to infection with certain organisms in persons whose resisting power was below normal. One striking result is that the patients feel better generally after the treatment. Other infections treated were the tubercle bacillus, 12; gonococcus, 6; pneumococcus, 3; streptococcus, 4; staphylococcus, 7; Friedlaender's bacillus, 1; Morax-Axenfield bacillus, 2; *B. xerosis,* 2; *Micrococcus catarrhalis,* 1. The infections with the tubercle bacillus comprised phlyctenular conjunctivitis and keratitis, 5; iritis, 1; chorioiditis, 1; keratitis, 3; episcleritis, 2. The results of treatment with tuberculin were excellent in all these cases, and Dwyer thinks that tuberculous eye affections are ideal ones for tuberculin treatment. The results from the use of vaccines in the other infections were equally gratifying, even including the three infections with the pneumococcus.

Autogenous Vaccines in Chronic Joint Affections. Rheumatoid arthritis, B. Hughes[6] says, is a misleading term. He would prefer to call the condition "metastatic arthritis"—that is, metastatic to some infective focus in the body. Pathologically, rheumatoid arthritis presents features of a chronic infection, the synovial membrane is pinker than normal, it is soft and succulent, and often villous processes project from it. The articular ends of the bones beneath the articular cartilage show rarefaction, while microscopically there is present some extent of round-celled infiltration in the synovial membrane. Although the synovial membrane is thickened, it does not show a tendency to ulcerate or undergo destructive changes, as in the case of tubercle, and possibly syphilis. The three main points in the treatment of the disease are: (1) to find the infecting organisms; (2) having found them, to raise the opsonic index of the individual

(6) Brit. Med. Jour., June 14, 1913.

against these organisms—this is most quickly accomplished by the use of autogenous vaccines; (3) having rendered the patient artificially immune, to remove where possible the primary focus and apply local treatment to the affected joints. The commonest foci of infection in Hughes' cases have been the teeth, the nose and nasopharynx, chronic otorrhea, the lungs, the intestinal tract, and leucorrhea.

Vaccine Therapy of Whooping-Cough. Bamberger[7] gives us these facts:

1. The treatment seems rather to lessen the severity of the disease and abort complications than to shorten the duration markedly, although only two of Bamberger's cases lasted as long as six weeks.

2. The sooner the treatment is begun, the better the results.

3. He used less vaccine than Graham. Graham's minimum dose was 240,000,000 and maximum 320,000,000, while his minimum was 100,000,000 and maximum 300,000,000. Nevertheless, he advises larger doses, say, 500,000,000, and more frequently (every day) as he thinks the course of the disease can be cut short by so doing.

4. He believes that this method of treating whooping-cough is deserving of a trial, as it certainly is harmless and may prove to be of great value.

Results of Vaccine Treatment of Whooping-Cough. The results obtained by the use of pertussis vaccine in a series of 17 cases of whooping-cough are reported by G. D. Scott.[8] The children ranged in age from 5 months to 8 years, and were for the most part poor, ill-nourished and badly developed.

The dosage which the author has found best is 40 million bacteria. This he gives even to an infant, twice a week, or in severe cases in old children, three times a week for one week only. If much benefit is noted, the intervals are prolonged, and *vice versa*. The buttocks were chosen as the site for injection, as the little patients can not then see the syringe, if properly held, and the

(7) Amer. Jour. of Dis. of Child., January, 1913.
(8) New York Med. Jour., Jan. 25, 1913.

area appears to be less sensitive than other portions of the body.

Many of the cases improved after a single dose. An infant of 5 months was cured; others were improved after the second, third, or fourth dose. In the few cases, numbering 3, in which the disease was not "cured," the symptoms were distinctly mollified, the number of attacks and their severity becoming less, cyanosis being less marked, and vomiting during the paroxysms no longer taking place; the children slept better. In none of the cases was there any reaction, local or general, from the vaccine.

The vaccine should be used only in undoubted cases of whooping-cough. The attendant should not be relied on as to the presence of a "whoop," but the lungs, larynx, pharynx, and epipharynx of the patient thoroughly examined by the physician before the treatment. The largest doses of vaccine should be given in the early stages of the disease. Infants require smaller doses, a less number of doses, and longer intervals between doses than do older children. The younger the infant, however, the more rapid has been the cure, in the author's experience. The writer advises the physician to have 6 vaccine vials of 20 million each constantly in his possession, for in families in which whooping-cough develops, a prophylactic dose of 40 million, given once or twice, may ward off trouble for the other members.

Effect of Vaccines on Paroxysms in Whooping-Cough. Thirty-three patients with whooping-cough were treated by Sill[9] with the pertussis vaccine, and in all the effect of the vaccine was to diminish markedly the number and severity of the paroxysms and the amount of vomiting. Absolutely no untoward effects from the use of the vaccine were noted. There were no complications in the cases in which the vaccine was used. No abscess formation, or even slight temporary inflammation or swelling at the site of the injection, and no general constitutional symptoms occurred. The longest time any of the children coughed was 12 weeks and 4 days. The longest time any child coughed after it was put under vac-

(9) Amer. Jour. Dis. of Child., May, 1913.

cine treatment was 9 weeks and one day, the average length of time being 4½ weeks. The injections were given every two or three days in most of the severe cases, and in the very severe cases every day for a few days, until the symptoms were relieved; the milder cases did not receive the vaccine so often nor so much at a time.

Prophylactic Meningitic Vaccination. J. H. Black,[1] of Dallas, Tex., refers to the former paper by Dr. Sophian and himself on prophylactic vaccination against meningitis, and reports the results of the repetition of the former experiments by himself on 8 of the 10 original subjects. The technic was identical with that before reported and in addition to the blood of a normal individual, acting as a negative control, the blood of a student recently recovered from a severe attack of meningitis was used as a positive control. He recognizes the fact that the experimental vaccination of healthy persons in the absence of an epidemic and the detection of immune bodies in the blood is an indirect way of proving its efficacy, which must be finally judged by its clinical application. He gives a tabulated statement showing the results of complement fixation in these cases and considers the following conclusions justified:

"1. Prophylactic vaccination produces a high degree of immunity in most cases, this immunity being demonstrable at the end of one year. It seems a justifiable conclusion that most individuals prophylactically vaccinated may safely consider themselves immune for at least one year. Exceptions to this will, of course, be found.

"2. Some individuals may show an actual increase in immune bodies at the end of the year over those demonstrable soon after vaccination.

"3. Fixation occurred with the serum of the positive control who had recovered from meningitis, but this fixation did not reach as high dilutions as did some of those vaccinated. This has been previously found also in some others recovered from the disease.

"4. Experimental evidence warrants us in concluding

(1) Journal Amer. Med. Ass'n., April 26, 1913.

that prophylactic vaccination is a measure of the greatest value in the control of the epidemic meningitis."

ZINC.

Uses of a Paste of Zinc Oxide. Oxide of zinc may be advantageously used as a paste, which easily dries and sticks sufficiently to afford good protection to any small wound or puncture, such as is made in giving hypodermic injections, diphtheria antitoxin, etc. The paste is made by simply adding a few drops of an aqueous solution of bichloride of mercury and ammonium chloride solution (1 to 2000 strength) to a small quantity of zinc oxide. The paste is especially applicable to slight wounds and abrasions about the face when a bandage is objectionable to the patient. In cases of sores about the face, especially in impetigo contagiosa, Hiden[2] removes all the crusts and washes the raw surfaces with bichloride solution, then makes the paste fresh and applies it well to the irritated places twice a day. The healing is usually rapid and satisfactory, and the glandular swellings often found in cases treated with ointments, sulphur, etc., do not appear. When there is much stinging and itching about skin abrasions the paste can be made more acceptable and soothing by substituting a 2 per cent. solution of phenol for the bichloride of mercury solution. The paste is very helpful in the treatment of indolent ulcers.

Zinc Perhydrol in Wounds and Ulcers. Many drugs do excellent service in venereal and leg ulcers, but the majority are objectionable for some reason or other. Iodoform frequently gives rise to a severe dermatitis and its odor is so strong that the patients are generally obliged to remain at home. Many of the substitutes of iodoform are very expensive and much less efficient. E. Brodfeld[3] has tested zinc perhydrol, a white, tasteless and odorless powder consisting of zinc oxide and dioxide. The powder was applied chiefly to soft chancres, incised buboes and ulcers of the leg. In infected ulcers the healing process was no more rapid than with iodoform, but clean ulcers closed in a remarkably short time. It is therefore

(2) Medical Summary, February, 1913.
(3) Klin.-therap. Wochenschr., No. 36, 1912.

best first to cauterize the injected ulcers with pure carbolic acid and then to apply the powder fresh daily. Dermatitis never occurs and buboes only rarely appear with this treatment. In buboes, the secretion is very soon reduced and healthy granulation tissue is formed in a surprisingly short time. The powder is here dusted into the cavity and the wound then covered with sterile gauze. In ulcers of the leg, a cure is not so rapid owing to the disturbance of circulation, yet, as a rule, the wounds close after from six to eight weeks.

Mal Perforans Treated With Zinc Perhydrol. A severe trophic ulceration of the foot, secondary to a thrombophlebitis in a very stout patient, advanced in years, was treated by R. Mueller[4] as follows: The wound was cleansed daily with hydrogen peroxide, diluted with twice the amount of water. By means of a spray, zinc perhydrol was then dusted on the raw surface; finally petrolatum, containing 10 per cent. bismuth subgallate was applied. The necrotic tissue very soon separated and the disagreeable odor disappeared and the secretion was checked almost entirely. The formation of granulations was slow and it required fully two months before the wound was entirely closed.

(4) Deutsch. med. Wochenschr., No. 49, 1912.

PREVENTIVE MEDICINE

HENRY B. FAVILL, A.B., M.D.

PREVENTIVE MEDICINE.

INFECTIOUS DISEASES.

General Considerations.

Final Abolition of Infection. Research work and clinical study are constantly adding to our knowledge of infectious diseases—how to prevent their occurrence and how to treat them and prevent their spread when they do appear in a community. Anatomic and physiologic lesions will develop so long as man must struggle to live among adverse conditions, but infectious diseases are not an essential part of the world and its ways. If the microörganism is excluded, the disease can not develop. To abolish infectious diseases we require nothing but the doing of it; the knowledge, the power, the mechanism are all ready. W. H. Hill[1] says that if we would have a sound mind in a sound body, a people high-bred, well cared for, hygienically housed, exercised, clothed and fed, we must get rid of infectious diseases, for it is just such a people who are most susceptible to infection. Turn to the animal expert and ask him what are the results of eugenics and hygienics of the highest order among horses, cattle, hogs and sheep: *Not increased resistance to disease, but increased susceptibility.*

How shall infectious disease be abolished?

First, by making that abolition, not mere restriction, our definite goal; second, by teaching the simple facts of present prevalence of infectious diseases and their prevention; and, third, by adopting a system for the sociologic supervision of every infectious person.

Spread of Contagion by Unrecognized Cases. The spread of contagious disease is attributed by M. Solis-

(1) Jour. of Health, March, 1913.

Cohen[2] chiefly to the unreported and particularly the unrecognized cases. Until every case is brought under the control of the health authorities no real progress will be made toward limiting or stamping out communicable disease.

Persons who would not object to having the disease reported, often dispense with a physician for financial reasons when their symptoms are not severe. Such cases might be brought to the notice of the health authorities if, in the absence of a physician, the parent or householder were required to report notifiable diseases, as they are now compelled to report a birth.

The greatest source of danger is the unrecognized case, for precautions are usually taken, even in an unreported case, if recognized. Even a physician sometimes fails to recognize mild atypical forms, as, for instance, latent diphtheria, which it is almost impossible to diagnose without a culture. In most such cases, the individual is not considered ill enough to warrant the employment of a physician. Thus a large number of children with mild or latent diphtheria (which passes as sore throat or tonsilitis) attend school and public gatherings, infecting many persons who in their turn become carriers or who may even have the disease in typical clinical form; and these children seldom know how they contracted the disease.

In like manner, numerous children with unrecognized scarlet fever or measles walk about the streets and attend school, especially during an epidemic of measles or rubella. Many of these cases are never known; some are discovered merely by accident. To illustrate, the author describes his accidental discovery of 11 cases of scarlet fever in one month during an epidemic of measles.

Solis-Cohen believes it is not only possible but practicable to bring these unrecognized and unreported cases under the supervision of the public health authorities. Nearly every case of illness is known to a number of persons, who usually are aware when there is a suspicion of its being contagious.

(2) Jour. Amer. Med. Ass'n., Sept. 28; 1912.

Many of the cases not reported to the health authorities are reported to other public officials. The vast majority occur among school children or in their homes, a large proportion during the school term. In such cases, the parent often notifies the school of the child's illness, sometimes giving the name of the disease. When this is not done, it is customary for the teacher or principal to send word to the parents asking the reason for the child's absence. In many cities, an attendance officer visits the home to learn why the child is not in school. It would be a perfectly easy matter for teacher, principal or attendance officer, on learning of the existence of a contagious disease, to report the case to the health authorities, who thereupon might investigate. Even when such disease is only suspected, the report of a suspicious case might be made, giving the grounds for the suspicion. This would include all cases of rash under any name, rumors brought by the school children, and unexplained or inadequately explained absences, especially during an epidemic. In schools having medical inspection the case might first be referred to the school doctor, who would decide whether the facts warranted the case being reported to the public health authorities as suspicious.

The author is of the opinion that if the laity were educated to realize the danger to themselves and their families as well as to others of the uncontrolled case, and the insidiousness of the unrecognized case; if they were frankly told that the prevention of communicable disease is possible with their aid and impossible without it; and if, moreover, they were taught to regard it as a civic duty to give this aid in the protection of the public health, their coöperation could be obtained. But then the responsibility would be on the sanitary authorities to see to it that the good did not suffer while the evil escaped. It would be their duty to enforce the laws against all and to prosecute those who break them. They will know when a physician has failed to report a case and they will be expected to hold that physician strictly to account. And should a law be passed requiring the householder to report contagious and suspicious cases occurring in his house, they must proceed against all

who are found violating that law. For the coöperation of the public is not to be hoped for in any unfair administration of the law that subjects those who comply with it to restrictive measures which those who disregard it are permitted with impunity to escape.

Advance of Knowledge of Infection. J. F. Anderson[3] discusses the recent additions to our knowledge of the etiology of infectious diseases.

It has been shown that poliomyelitis may be transmitted by inoculation to monkeys and occasionally to rabbits. The disease belongs among the filterable viruses; that is, its virus is capable of passing through earthenware filters and, consequently, is so minute that it can not be seen even with the highest powers of the microscope. It has been shown that the virus is present in various organs or human beings dead from poliomyelitis and that the tonsils of monkeys, five months after the acute stage of the disease, still contain the infective agent. The same is probably true of human beings, and such persons might well become sources of infection.

The existence of the virus of the disease in the buccal and intestinal secretions of persons with no history of recent illness, but who had come into intimate contact with other persons in their family sick with poliomyelitis, has almost justified the conclusion that the infection is disseminated by transfer of the virus directly from person to person; but doubt was cast on the validity of such a conclusion by M. J. Rosenau, who found that stable flies (*Stomoxys calcitrans*) might transmit the disease. He stated that six out of twelve monkeys exposed daily for several weeks to the bites of large numbers of stomoxys, which were daily allowed during this time to bite monkeys experimentally infected with poliomyelitis, had developed symptoms of the disease. Two of the number had become paralyzed and died, three were paretic at the time of the report, and one recovered after a short illness.

In view of these apparently conflicting findings, the

(3) Vermont Med. Monthly, Jan. 15, 1913.

question at present remains an open one as to whether the disease is directly contagious, whether a biting fly is a necessary factor in its transmission, or whether it may be conveyed in more than one way.

The results of studies on measles give us our first definite information based on carefully controlled laboratory experiments as to the seat of the virus, its means of exit from the body and the probable avenue of infection. The experimental observations on the duration of infectivity of the secretions are in accord with previous clinical observations that cases of the disease are, as a rule, not infective after convalescence is well established. The great importance of this point, and the further one as to the non-infectivity of the "scales," from a public health aspect can be readily appreciated.

No definite facts have been established regarding the etiology of scarlet fever. The etiologic relation of streptococci is still unproved.

Metchnikoff and Besredka have shown that the chimpanzee can be infected by feeding typhoid feces, but not by a filtrate and can be immunized by cultures of living bacilli. Vaccination with non-sensitized cultures produced an intense local and general reaction, while sensitized cultures caused only a feeble local and almost no general reaction; both appeared to confer equal immunity to infection.

The work reported by Metchnikoff and Besredka fulfils for the first time the postulates of Koch as to the etiologic relation of the *Bacillus typhosus* to typhoid fever, discredits the theory of a filterable virus in the disease, shows the possibility of absolute protection by vaccination with living cultures, and emphasizes the importance of not relying on vaccination with killed cultures to the exclusion of all other precautionary measures.

It has been a subject of wonder to health authorities that in spite of the occasional arrival in this country of immigrants sick with typhus and of many persons from endemic foci of the disease, typhus fever apparently did not gain a foothold in the United States.

That this had already taken place has recently been shown through the demonstration in the Hygienic Laboratory, U. S. Public Health Service, that a disease observed and studied in New York City by Dr. Nathan E. Brill is identical with typhus fever.

Seven monkeys that had recovered from an infection with virus obtained from a case of Brill's disease were tested for their immunity to Mexican typhus, together with nine fresh animals.

Of the seven Brill-immune monkeys, not one showed any reaction as a result of inoculation with virulent typhus fever blood; while all nine of the control animals developed the fever.

These results justified the conclusion that an attack of Brill's disease confers immunity to subsequent infection with Mexican typhus and, conversely, that an attack of typhus confers immunity to subsequent infection with Brill's disease, so-called, and that this disease and typhus fever are identical.

The demonstration of the endemic presence of typhus fever in the United States requires the American sanitarian to recognize the existence of a problem of which he has heretofore been unaware, and to be on his guard against a disease that may at any time assume epidemic prevalence and virulence.

Insect Carriers.

Lice. The danger of lice as disease carriers is emphasized by L. Lagane.[4] Aside from measures against the deplorable conditions of promiscuousness among the poor, it is necessary to secure cleanliness of carriers of lice. Effective measures for getting rid of lice are the douche and thorough lathering or anointing the body with camphorated oil; and it has been shown that large typhus epidemics have been arrested where soap and water penetrated. The clothing should be washed in lye or disinfected in the oven or piece by piece, or sulphur may be burned (40 grams to the cubic meter), or wool garments may be saturated with carbolic acid

(4) Presse Méd., Sept. 14, 1912.

solution and pressed while still wet, with a rather warm iron.

The destruction of head lice is slightly more difficult. Washing the hair in camphorated alcohol, with subsequent envelopment of the head during the night with compresses soaked with half strength van Swieten's liquor (a solution of mercuric chloride 1 to 1000), and covered with oiled silk is almost always sufficient and rarely needs to be repeated.

For prevention of contamination some authors advise anointing the exposed parts, especially against fleas, with camphorated oil, petroleum or oil of eucalyptus or relying on the odor of insect powders.

Flies. C. J. Martin[5] has made a study of insect carriers of bacterial infection.

A well-fed fly deposits feces abundantly. Graham Smith (1910) noticed flies defecating ten times in the first hour after feeding. A curious habit of flies to which attention was first drawn by Graham Smith is the regurgitation of the contents of their crops. This has already been referred to as a means by which they are enabled to feed on dry material soluble in water. They do this very frequently when walking about over a clean glass, possibly with the idea of extracting nourishment from it. A fly after a good meal may often be seen blowing fluid bubbles from its trunk, and sucking them in again, as in the diagram, Fig. 5, perhaps for practice.

From the above account it is clear that there are *a priori* reasons for suspecting the fly of carrying bacterial infection. Born in a dunghill, it spends its days flitting between the sugar basin, milk-pan, and any fecal matter available. Its hairy, probably sticky, feet, and the habit of regurgitating the contents of the crop and defecating at frequent intervals suggest it to be an excellent inoculating agent for any bacteria it may pick up in the satisfaction of its unsavory tastes.

That it does, indeed, operate in this way has been abundantly demonstrated. Flies which have wandered over cultures of organisms and afterward been allowed

(5) Lancet, Jan. 4, 1913.

to walk on sterile agar plates, leave a rich crop of germs as their foot-prints, which can be demonstrated by subsequent incubation. Castellani (1907) transferred yaws to monkeys in an analogous way.

The carriage of infection in the alimentary canal and its deposition by regurgitation or feces has also been shown over and over again.

Are flies the determining factor in epidemics? Although flies may and do carry the infective virus of a

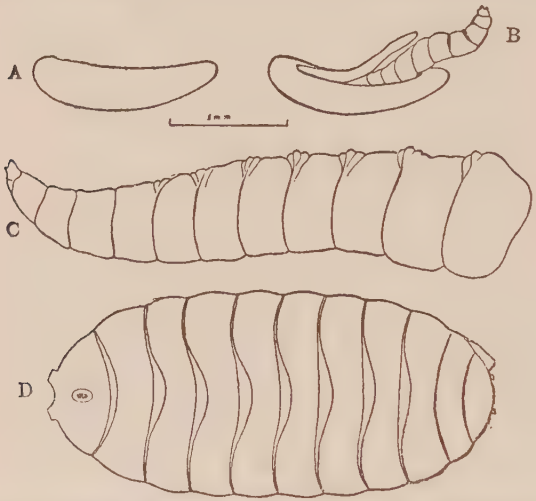

Fig. 1.—A, the egg. B, the larva emerging. C, the half-grown larva. D, the puba.

number of diseases in or upon them, and by their habits may not unlikely serve as agents in transferring infection, it by no means follows that they are the determining factor of epidemicity in the case of cholera, typhoid, dysentery, etc. In the case of fulminating epidemics of typhoid and cholera associated with an infected water-supply this is obviously not so.

The conclusion that fly transmission is the principal means of spread of typhoid fever in military encampments and stations has been arrived at by a number of

competent observers. In considering the possible influence of flies in the spread of typhoid fever in a well-sewered city, it must be remembered that the opportunities for flies to pick up the infection are vastly less than under the conditions of a military encampment, or even in rural surroundings.

FIG. 2.—A leg and foot of fly.

Dr. J. Niven (1910) has made observations on the prevalence of flies in Manchester since 1904. From 12 to 34 bell traps were served out to the inhabitants of small dwellings in different quarters of the town, and the catch was collected every few days by his inspector. By these painstaking observations data have been ob-

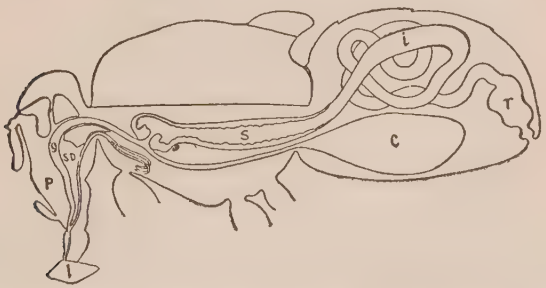

FIG. 3.—Diagram of alimentary canal and mouth parts of house-fly. P, Pump. *l*, Labella. *g*, Gullet. S D, Salivary duct. S, Stomach. C, Crop. I, Intestine. *r*, Rectum.

tained which, although not extensive, are sufficient to afford information as to the general time relationship between fly prevalence and the incidence of typhoid fever and infantile diarrhea.

Speaking generally, the typhoid season in Manchester is considerably later than the diarrhea season, and the cases of typhoid reach a maximum in late autumn

at a time when most of the flies have already disappeared. The census of flies commenced in 1904, and coincides for the years 1904-1909 fairly well in time with the diarrhea deaths, if these are antedated ten days to allow for the average period ensuing between commencement of the disease and death. If we assume that the same close time relation existed throughout, the observations taken as a whole seem to lend little support to the view that typhoid fever in Manchester is

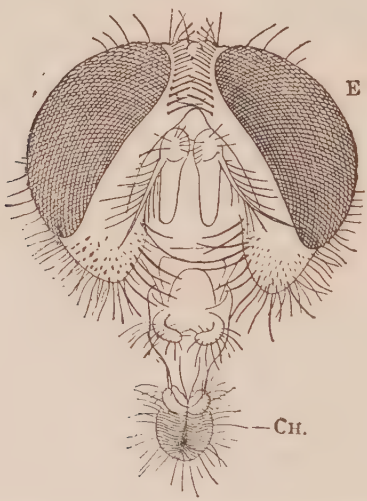

FIG. 4.—Front view of a fly's head, showing proboscis and chitinous channels (CH); E, E, Eye.

to any material extent dependent on transmission by flies.

The time relation of fly prevalence and cases of typhoid fever was also studied in Washington during 1908 by Rosenau, Lumsden and Kartle (1909) in collaboration with Howard, entomologist to the United States Department of Agriculture. In Washington in 1908 the flies (*Musca domestica*) appeared in considerable numbers in April and reached a maximum in July.

During August and September they steadily diminished to about one-third and rose again in October. The relation of the two curves was not such as to suggest that flies are an important factor in the dissemination of typhoid fever in Washington. In a subsequent report on typhoid fever in Washington, Lennoden and Anderson (1911), from an analysis of the incidence of typhoid fever on the population using privies or yard closets, discovered that the greater prevalence of the disease among these persons during the summer coincided with the fly season.

Many of the facts brought forward merely indicate some form of infective agent, and do not necessitate recourse to the hypothesis that carriage by flies domi-

FIG. 5.—A fly blowing bubbles.

nates the situation. Martin points out (1) that the fly-carrier hypothesis is the only one which offers a satisfactory interpretation of the extraordinary dependence of the epidemic on the accumulated effect of temperature; (2) that it offers a ready explanation of the spread of infection to neighboring children who have no direct personal contact with the patient, and (3) that the peculiarities of the relation in time between fly prevalence and the epidemic in different localities are not inconsistent with the view that fly carriage is essential to epidemicity.

No other interpretation which is so far forthcoming is nearly so satisfactory, and it is at least worthy to guide in the meantime our efforts at prevention.

Fleas. W. Nicoll[6] made experiments to determine how long the flea removed from its host might live. Rat fleas (*Ceratophyllus fasciatus*) were removed from their host and kept under various conditions of light, temperature, moisture, etc., in order to determine their length of life without feeding. Altogether 64 experiments were performed, involving a total of 463 fleas. The average length of life at ordinary temperatures was found to be 6.8 days, but the maximum in one experiment was over 40 days. Two per cent of the fleas lived for over 3 weeks, and 10 per cent for over 2 weeks. They live longer in winter than in summer, the difference being about 2.5 days on an average. At very low temperatures (0°—8° C.) their life may be prolonged to over two months. Both excessive moisture and excessive dryness are inimical, but a certain amount of moisture is beneficial. Darkness does not prolong their life, for those which were kept in bright daylight lived, on an average, longer than those kept in the shade or in darkness.

It was further found that fleas may remain in the larval and pupal stages for much longer periods than normal under certain circumstances. Several experiments were made to determine this point. In the first, material containing fleas was removed from a rat cage and isolated. It was observed to remain infected with fleas for a period of over 5 months. A second experiment continued to produce fleas for a period of 11 months. In a third experiment this period was extended to 14 months. Some fleas in this experiment at the end of a year were placed along with a young rat, and in 3 months they had multiplied very considerably.

From these experiments it is evident that the larval and pupal stages of the rat flea, which normally last from 2 to 6 weeks, may be prolonged to over a year. As seen in the first set of experiments, the length of life of an adult flea under these conditions is generally under a month, and no evidence was obtained that the fleas multiplied during the period, although this may be possible; so that it may be concluded that the appear-

(6) Brit. Med. Jour., Oct. 12, 1912.

ance of adult fleas after such a long period as a year was due to the larval and pupal stages being prolonged.

The importance of these observations to preventive medicine lies in the fact that as fleas are carriers of disease, it may be—and is—of considerable moment to determine exactly how long they can exist under various conditions. A full account of these observations is being prepared for publication.

As the result of his experiments Nicoll deduced the following conclusions:

1. Material infected with fleas and larvæ may remain infected for as long as a year.

2. This appears to be due to the fact that the larval and pupal stages in the development are greatly prolonged under the adverse conditions. Dampness, however, rapidly kills off both fleas and larvæ.

3. No direct evidence was obtained that the fleas bred under these conditions; but the appearance of larvæ toward the end of some of the experiments suggests that they did breed to some extent.

4. Fleas derived from the infected material readily attacked rats, and proceeded to multiply in the course of a short time.

Tuberculosis.

Prophylaxis. *Procreation.* In considering some phases of the anti-tuberculosis warfare S. A. Knopf[7] gives the following advice regarding procreation: Vasectomy should be undertaken in all tuberculous male patients who are willing to submit to this operation. Knopf would make this operation obligatory for any one who is acutely tuberculous and insists on marrying. He would insist on the ligation of the Fallopian tubes for all female patients in the same situation. He would teach even slightly affected tuberculous parents or married people, not only all the details of prophylaxis so that they would avoid infecting others, but also teach them how not to procreate while either one of them is acutely afflicted with the disease. Only when found in really good health, as a result of a careful

(7) Med. Record, Feb. 1, 1913.

examination by a competent practitioner should they feel that they have a right to procreate. Statistics show that the later born children of large families more often contract tuberculosis. While direct bacillary transmission through the placenta is possible it is rare. Knopf is more and more in favor of therapeutic abortion in tuberculosis. Prevention of a tuberculous conception, the limitation of children in a tuberculous family, the emptying of the uterus of a tuberculous mother, otherwise doomed to prolonged invalidism, if not to an early death, the prevention of tuberculous or predisposed children coming to the world not only handicapped by disease but also by poverty and want and sure to become a burden to the community, is not race suicide but race preservation.

Until the time when radical interference in pregnancy in tuberculous subjects becomes universal, maternity sanatoria must be maintained where these cases, in which emptying of the uterus has been neglected, can be isolated and treated hygienically and dietetically for at least six months before and after childbirth.

Early Diagnosis in Children. Knopf advises the use of the von Pirquet test in children two, three and four years old as a guide to early treatment. He strongly advises an increase in the number of open-air schools. He believes that the kindergartens not under direct public school supervision are an especial source of infectious disease propagation.

It is reported that there are now in the United States 200 open-air schools. While this constant growth is gratifying in the extreme, the number of open-air schools must be many times multiplied in order to accommodate the 600,000 school children in this country who are afflicted with tuberculosis.

Child Labor. The following are the aims of the National Child Labor Committee and should be realized in all our states if tuberculosis is to be eradicated:

To exclude young children and undeveloped children from the burdens of wage-earning industries.

To forbid employment of all children and youth in industries which menace life, health, and morals.

To limit the hours, forbid night work, and otherwise guard the conditions of children and youth who may be employed.

To promote the efforts of the public schools to meet the recognized needs of an industrial civilization.

Industrial Insurance. Knopf quotes Dr. Fraenkel with reference to insurance against sickness and especially against tuberculosis as practiced in Europe:

"The day must come when these insurance schemes will receive recognition in the United States. The day has gone by when social problems may be considered purely from the standpoint of philanthropy. It is contrary to an orderly scheme of things to permit individuals to work under evil conditions, to receive insufficient wages, to subject themselves to disease, and to expect that they shall be satisfied, when they suffer from accident or disease, to receive as a privilege the dole which charity or philanthropy is permitted to hand to them. Germany realizes that the State has distinct obligations toward its citizens. Not the least of these is protection against the risks of life and health incidental to our complex industrial development. It is realized that the workingman alone can not protect himself against the contingencies of life, particularly against sickness, accident, old age, and unemployment, and that opportunity must be given to him, through some insurance plan, to realize that these contingencies, when they arise, will not deprive him of the means of livelihood. Tuberculosis as a social disease must be considered as one of these contingencies. As a social disease it is recognized that its causes in many instances are obscure; that its effects are far-reaching and affect not only the individual, but the community."

"That it is possible to devise an insurance scheme to meet the exigencies arising from the results of the disease there can be no doubt. Of more importance, however, is the conception that in such a scheme there shall be the opportunity to prevent tuberculosis. Precisely what system may be finally adopted in the United States is still problematic. That the subject is worthy of the

consideration of the best minds and the best thought goes without saying."

Housing. Knopf emphasizes the importance of improved housing conditions. The great educational campaign has taught the consumptive and those living with him that a hospital for consumptives means a place to die in; a sanatorium, a place to get well in. For this reason, Knopf suggests calling the institution in the city or near the city, destined to take care of advanced cases, "sanatorium-hospital" or "hospital-sanatorium." Because the advanced cases among the poor consumptives in large cities are numerous, the existing institutions are often over-crowded. Old former general hospitals are used for the care of such cases, and because of the seeming hopelessness of many of them relatively little care is bestowed on all. If we wish to attract the advanced cases to such hospital-sanatoria we must above all make the place attractive, even beautiful. We must bestow on our consumptive poor, though they are no longer in the incipient or early stages, the same care and comfort which are given to the well-to-do who are received in many private sanatoria in the advanced stages so long as they are able to pay. The disease in some advanced tuberculous cases can be arrested, in many life can be prolonged and made comfortable, and in not a few instances even an economic cure can be accomplished.

As an aid in prevention of tuberculosis it is essential to provide an abundance of nutritious food and it has been suggested that this may be accomplished by reducing the high cost of living through making agriculture more attractive.

Examination of Immigrants. To avoid tuberculous immigration every prospective immigrant should be examined to ascertain his freedom from tuberculosis by two competent medical men, one appointed by his home government and one by the steamship company which is to transport him to this country, with a certificate from each examiner showing freedom from tuberculosis.

Disinfection. J. T. A. Walker[8] discusses the benefits

(8) American Med., February, 1913.

and methods of disinfection. He believes that disinfection can prevent thousands of cases of consumption. The home of the consumptive should be regularly disinfected and especially after his removal or death, and disinfection should always be carried out when the patient changes his address. The author emphasizes the importance of disinfection of soiled clothing, especially such as can not be boiled. The schoolroom should receive thorough disinfection, and similar methods should be applied to cars and other places liable to infection. As to the method, Walker calls attention to the fact that fumigation is beginning to be displaced by the use of sprays applied directly to the infected material. As a matter of fact, fumigation by formaldehyde and other gases is really the application of a spray, since the gaseous disinfectant is only active in the presence of an abundance of moisture. Walker also shows that the cost of disinfection need not be prohibitive.

Obligatory Notification. At a recent session of the *Academie de Médecine* Letulle proposed obligatory notification of cases of tuberculosis. This was vigorously opposed by the medical societies of Paris and the rest of France and by the association of physicians practicing at the various health resorts. A. Renault[9] proposes instead that the patient be furnished with an antiseptic solution in a suitable vessel for the disinfection of the sputum, the vessel being emptied down the water closet at night and carefully cleansed. After death he would have the municipality send a disinfector as soon as practicable after the return of a death certificate indicating a death from pulmonary tuberculosis. This is done voluntarily by the authorities in some sections of Paris. He thinks that if properly done few would raise any objection. In a similar manner disinfection should be secured after each change of residence.

General Measures. The measures necessary in prevention of tuberculosis are summed up by H. W. Hill[1] as follows:

(9) Presse Méd., Dec. 18, 1912.
(1) Journal-Lancet, Feb. 1, 1913.

Tuberculosis is a typical infectious disease, and it must be handled on the same principles as any other infectious disease; hence, by blocking the routes of infection, but chiefly by finding the sources and preventing spread thence.

Of the five great routes of infection—water, food, flies, milk, and contact—human tuberculosis travels chiefly by contact, through sputum, mouth-spray, and hands, directly, or almost directly, from patient to prospective patient. Practically, it is spread exactly as scarlet fever or diphtheria is spread. Public flies and public food supplies are comparatively insignificant conveyors. Public water supplies are almost negligible, and public milk supplies act chiefly in conveying cattle tuberculosis to man, although, if the milk be handled by tuberculous humans, it may convey human tuberculosis also.

It is evident, then, that blocking of routes, since the most important one is contact, involves chiefly the far more important measure of finding the source, just as in scarlet fever, or diphtheria; and if these sources are found and prevented from access to the routes, the routes may be disregarded. The measures for finding the human sources, practically the "open" cases of lung tuberculosis in the human, are epidemiological and have been discussed in principle before.

The thing to do first is, find the recognized "open" cases, whether they be in early, advanced, or late stages, and place them where they can spread the disease no further. Then search the "zones of infection" surrounding them, *i. e.,* their relatives and associates, for mild, unrecognized or concealed cases, and also for incipients, handling all "open" infectious cases thus found, in the same manner.

The measures necessary for finding the animal sources (infected milch cows) are the well-known tuberculin test of herds, with proper repetitions, and the elimination of the tuberculous animals. Serious enough as cattle tuberculosis in the human is, its prevalence, nevertheless, is so much less than that of human tuberculosis and its infectiveness in the human is so nearly negligible, that, if our efforts were concentrated wholly on human

tuberculosis, more cases and more deaths would be prevented, in a year's work, than efforts on bovine tuberculosis, however successful, could possibly achieve in many years.

W. A. Kriessel[2] advocates the education of the public regarding tuberculosis and the enactment of laws to restrict the spread of bovine tuberculosis.

Relation of Seed to Soil. H. Sutherland[3] reports conclusions from the investigation of 723 contacts of 204 patients to determine the relations of the seed and the soil in the production of tuberculosis. His results are as follows:

1. There is more tuberculosis among the children of consumptives than among the children of healthy parents.

2. This may be due to their exposure to infection, to their lowered general health, or to their heredity.

3. There is more tuberculosis among the children of infectious consumptives than among the children of non-infectious consumptives.

4. This must be due to exposure to infection plus lowered general health, inseparable from it as the result of the stage of the disease in the parents.

5. Therefore it is not heredity which determines whether the children of consumptives will develop the disease, but the existence of certain immediate factors which are under our control.

Owing to the rapidly increasing number of tuberculosis dispensaries in Great Britain, the data on which these deductions are based may be tested on an unprecedented scale. If they be corroborated, it means that the influence of heredity is disproved once and for all. Of greater import, it will imply that if our present activity against tuberculosis be augmented we may look with confidence to the total eradication of this disease. On the other hand, should it be proved, as has too long been taken for granted, that soil and seed are independent factors, then, even by a direct attack on the seed (by diminishing the sources of the tubercle bacillus), it

(2) Lancet, Nov. 1, 1912.
(3) Brit. Med. Jour., Nov. 23, 1912.

would be more difficult to exterminate the malady completely so long as the soil remained (as represented by inherited qualities). This is not so. The children of infectious tuberculous patients and of non-infectious tuberculous patients are all the children of consumptives. The difference in their susceptibility to infection is the direct result of the stage of the disease in their parents. What has been termed for a century "soil" is really the result of the pathogenic action of the "seed." Soil and seed are not independent factors, for they are one and the same. If, then, by the coördinated Edinburgh system, the disease is controlled at every point, the resistance of the population exposed to infection will also be raised. The truth is this—*that the seed creates the soil.*

Infectivity of the Tubercle Bacillus. In considering the duty of the State in regard to the prevention of tuberculosis, A. Ransome[4] calls attention to the following points concerning the infectivity of the tubercle bacillus:

1. First, the tenacity of life of the bacillus of tuberculosis, when fed with suitable material, and when left for long periods under what are known as insanitary conditions.

2. Its resistance to ordinary disinfectants, to putrefaction, freezing and thawing, etc.

3. Its rapid loss of virulence under the influence of fresh air and sunlight.

4. The incubation period, and the temperature of growth, of the organism. It is no longer regarded as a pure parasite, existing only at the temperatures of the mammalian body. Many observers have now succeeded in growing it within wide ranges of temperature; and Ransome has himself grown it in the condensed vapor of human breath, and in that from ground air, at ordinary English spring and summer temperatures.

5. The infectivity of tuberculosis dust, under differing circumstances of light and air.

6. The association of the bacillus of tuberculosis with

(4) Brit. Med. Jour., Nov. 16, 1912.

other organisms, such as the *Micrococcus tetragenus*, and various cocci.

7. The varying powers of resistance to infection offered by the human body.

8. The researches as to the relations between bovine and human tuberculosis.

All these subjects have now been carefully studied, and will have to be taken into account in any concerted scheme for the prevention of the disease.

It must never be forgotten that infection by tuberculosis is conditional, and that the conditions under which it can take place are mainly three: (1) the presence of a virulent form of the bacillus; (2) a susceptible body to receive it; and (3) such external circumstances as are favorable to infection.

Compulsory notification of all cases of tuberculosis; the penalization of spitting; gratuitous examination of sputum, etc., for the bacillus; disinfection of the dwellings and clothing of tuberculous persons; the provision of sanatoriums and of "homes for advanced cases," of dispensaries, and of colonies for quiescent cases and the State supervision of all cattle, and the formation of non-tuberculous herds are all of them likely to be of great use, and will probably all have to be brought judiciously into action, sooner or later; but the reformers have under-rated the difficulties in the way of the task. Moreover, in some respects they go beyond, and in others they fall short of, the requirements of the case. Thus, if these methods were applied without discrimination to all cases of tuberculosis, they would inflict sore punishment on many perfectly harmless individuals, and would brand them as if they were lepers. Dr. Koch himself, in his last Nobel Lecture, sums up the case thus:

Patients with closed tuberculosis are to be regarded as quite harmless. Even those who suffer from open tuberculosis are harmless so long as the tubercle bacilli expelled by them are prevented by cleanliness, airing, etc., from infecting. The patient becomes dangerous only when he is personally unclean, or becomes so helpless in consequence of the far-advanced disease that he

can no longer see to the suitable removal of the sputum. For the healthy the danger of infection increases with the impossibility of avoiding the immediate neighborhood of a dangerous patient—that is, in densely inhabited rooms; and quite specially if the latter are not only overcrowded but also badly ventilated and inadequately lighted.

Duty of the State. The measures that the State can take to mitigate the second condition of infection by tuberculosis are identical with those required to meet the third—namely: The removal of unhealthy surroundings. This is first done by the provision of healthy homes. Tuberculosis has been rightly termed a "house disease." The author has shown that the disease clings to certain districts in Manchester and Salford, and even to certain houses, and similar observations have been made by Dr. Niven and Dr. Flick, of Philadelphia. Dr. Flick says: "Of all disease, tuberculosis more than any other is a house disease. It is implanted in the house, develops in the house and matures in the house."

Obviously, then, the first duty of the State is to see that the people are healthily housed; and not only must the houses themselves be properly constructed, under stringent "building by-laws," but, by wise "town-planning," by the destruction of neighboring insanitary property, by proper drainage and water supply, and by other measures, the air that circulates around these houses must be kept pure, and all such sunlight as this country affords must have full play on them.

It follows, therefore, that the State must not only make provision for cubic space in dwellings and for the admission of so many cubic feet of air to them, but that it must also see that this air is fairly pure, and that the ventilation shall sweep away "air sewage" from these rooms and from all places where human beings congregate. Hence, also, in town planning, and in the reconstruction of unhealthy areas, free course must be given to the winds of heaven; there must be no blind alleys or courts, and any pollution of the atmosphere must, so far as possible, be mitigated.

The ventilation not only of schools but of all places

of public resort—such as churches, chapels, theaters, even of public houses, restaurants, and shops—must be placed under State control; and all work-places and factories must be kept as clean as possible and well supplied with fresh air.

The State will also be strictly within the scope of its legitimate action if it provide for the dangerous cases of open tuberculosis, if it subsidizes homes for the dying, and tuberculosis dispensaries, and if it assists the formation of herds of cattle, free from disease, as has been done in Denmark.

Tuberculosis in Children. The problem of the relation of tuberculosis in childhood to the infection of adults is discussed by Hillenberg,[5] who opposes the view of Römer and others that adult tuberculosis is due to a re-infection from a focus latent since infancy which has produced a limited but insufficient immunity. The new infection, according to Römer, is generally to be regarded as a metastasis from the unhealed focus of infantile infection. Hillenberg brings a number of facts of statistical nature to show the untenability of this hypothesis. The mortality rises with the increase in age which would hardly be the case if any immunity had been acquired by early tuberculosis. The studies of Dörner have shown that tuberculosis in the parents exerts scarcely any influence on the development of disease in the offspring after they have left the parental roof, *i. e.*, after the age of 25. The influence of overcrowding, and of dwellings in which tuberculosis has existed is particularly marked.

Hillenberg concludes: 1. No important etiologic rôle is to be ascribed to the infection in childhood in the genesis of adult phthisis. 2. The eradication of tuberculosis among children must still depend on the recognition of adult tuberculosis as the chief source of infection.

Prophylactic Dispensaries. Two methods of extreme importance of municipal control of tuberculosis are emphasized by R. M. Stith:[6] These are the babies' pro-

(5) Deutsche med. Wochenschr., Oct. 24, 1912.
(6) Northwest Med., March, 1913.

phylactic dispensaries and a preventorium for children. Both are designed to increase resistance to tuberculosis as well as to other infections.

The prophylactic dispensary is not for the treatment of sick babies, but for instruction of mothers in order that they may keep their babies well. The preventorium is practically an open-air sanatorium, where children of tuberculous parentage or association, who may be the subjects of latent tuberculosis, may be sent for indeterminate periods in order that nutrition and resistance may be improved.

Isolation of the Tuberculous. Myer-Lierhein[7] discusses the question of isolation of the tuberculous and protests against carrying this measure so far that the campaign against tuberculosis becomes a war against the tuberculous. Too great strictness in this matter will lead the tuberculous to avoid the institutions intended for their care. He suggests that a more humane way would be to establish colonies in a mild climate in which all the inhabitants would be tuberculous, or at least, belong to tuberculous families. In this case the tuberculous patient could still earn something by light work, could have his family with him and in case he were single could marry a woman with tuberculosis without serious objections. He suggests an association of all tuberculous patients which should manage affairs and extend mutual aid and assist in solving the tuberculosis problem.

The Indigent Tuberculous in the West. I. H. Alexander[8] found from personal observations that the attitude of many western towns was decidedly antagonistic to the patient with tuberculosis, even when the disease was in its early stages. He says:

"The patient of moderate means who desires to live outside of a sanatorium is no more welcome in a home than his poverty-stricken brother. The first question the hotel clerk will ask when you register is whether

(7) Deutsche med. Wochenschr., April 24, 1913.
(8) Pittsburgh Med. Jour., April, 1913.

any of your party have lung trouble and will insist on looking you all over if you answer in the negative before giving you accommodations. If you consult a real estate man to rent a house, you will have the same questions to answer and receive the same reply as from the hotel man, if you are a health seeker. Should you in some way get a room or rent a house and desire to take your meals at the hotel or restaurant, the rates are advanced until they are prohibitive. The cost of living in the west is high at best, owing to the long distance from the source of production."

Typhoid Fever.

General Measures. After discussing the present status of our knowledge regarding the transmission of typhoid fever A. W. Freeman[9] says:

"Summing up, we may say that the essential basis for the prevention of typhoid fever has been laid and that we are now in possession of the information, biologic and technical, necessary for the actual eradication of the disease from the urban communities of the United States. The basis for prevention in rural communities, while not complete, is sufficiently certain to insure a great reduction in present rates. The problem is no longer an investigative or scientific problem, but a problem of administration. When the people of the United States wish to pay for absolute protection against typhoid fever it can be bought with the full assurance that the goods can be delivered."

Situation in Cleveland. From an investigation of the typhoid situation in Cleveland during the year 1911, T. S. Jackson and R. G. Perkins[1] draw the following conclusions:

1. In the year 1911, typhoid fever was present throughout the year in endemic form, with two epidemic rises, one occurring after the spring thaw, the other in the late summer.

2. Examination of the etiologic factors shows that greater accuracy of records in the reporting of cases

(9) Southern Med. Jour., June 1, 1913.
(1) Cleveland Med. Jour., November, 1912.

to the health office is necessary, and that the present incompleteness makes it very difficult to establish the cause in many cases.

3. The alterations in the incidence curve and in the fermentation curve after the disinfection of the water suggest that some at least of the endemic typhoid is water-borne.

4. The nearly constant pollution of the water at the four-mile crib, the absence of any adequate source for such pollution other than the infected water along the shore, and the assurance that these pollutions may occur at any time and without sufficient warning, lead us to believe that the water supply is not safe without some sort of purification, and that if chlorination is to be continued, the disinfectant must be administered in sufficient amount to reduce the fermentation findings to a minimum.

Spread by Lettuce. H. Byrd and C. W. Bartlett[2] present their conclusions as to the origin of an outbreak of typhoid fever and amebic dysentery at Tampa, Fla. They found no reason to incriminate the drinking water, milk, oysters, or any of the usual sources of infection. On the other hand, the evidence pointed to the agency of lettuce contaminated by the overflow of a stream polluted by typhoid discharges.

Typhoid Carriers. The difficulties surrounding the attempt to free typhoid bacillus carriers of their germs are discussed by Schroeter.[3] According to German law, there appears to be no process by which such persons can be detained, but resort must be had to persuasion. Careful oversight by the physician may be of service, although the patients are apt to grow lax in availing themselves of such services. Unfortunately, no certain means of ridding the patient of the bacilli is known, both medical and surgical measures having failed. Further research on this subject is desirable.

Transmission by Flies. C. E. Terry[4] describes the measures taken at Jacksonville, Fla., to prevent the

(2) Southern Med. Jour., November, 1912.
(3) Deutsche med. Wochenschr., Oct. 3, 1912.
(4) Southern Med. Jour., June 1, 1913.

transmission of typhoid by flies. These consisted of an ordinance passed in August, 1910, requiring all privies to be rendered fly-proof, so that at the beginning of the fly season of 1911 between 80 and 85 per cent. of all privies had been reconstructed. The ordinance required tight construction, the screening of ventilating openings, self-closing doors and seat covers, and well fitting hinged back-boards. In order so far as possible to avoid unnecessary hardships on property owners, the law was so framed as to permit the repairing of privies already constructed, where it was possible in this manner to ensure fly-proofing. Where, however, such repairs would not have accomplished desired result, entire new construction was required.

Beginning with January, 1911, the department has required that the sick room, in every case of typhoid, be screened and the flies destroyed by means of poison or sticky fly paper. This routine has been carried out by detailing an inspector to visit each case every other day from the time of its reporting until convalescence is established. Where the financial condition of the family renders the screening of the sick room a hardship, mosquito netting, sticky fly paper and disinfectants have been furnished by the health department, and their use strictly enforced and watched. Printed instructions supplement oral ones in each case.

As a result of the screening of privies and sick-rooms the number of cases of typhoid reported to the health department during 1911 was 148 against 329 for 1910, the deaths for the same year being 40 against 62 in the previous year.

Preventive Inoculation. The importance of preventive inoculation with typhoid vaccine has been established for large bodies of men like the army, so that it is now accepted as a routine measure under such conditions. How far it is applicable in civil life is a matter for discussion. For civilians who are especially exposed to infection, such as nurses, inoculation seems to be advisable. The experience of L. H. Spooner[5] shows that their morbidity under ordinary conditions is 1.4

(5) Jour. Amer. Med. Ass'n., Oct. 12, 1912.

per cent., or 19 cases among 1,361. Case morbidity among the uninoculated is nearly nine times greater than among the inoculated, subjected to similar conditions.

F. F. Russel[6] believes that all who come in contact with persons ill with typhoid should be immunized, including the personnel of dispensaries, various charities, and undertakers. The inhabitants of industrial villages with a large typhoid morbidity, and camps of miners, engineers, should be given the advantage of this prophylactic, and the same is true of those who go to the country or to places where the drinking water is of uncertain purity.

F. W. Hachtel and H. W. Stoner,[7] after an analysis of about 2,000 cases of anti-typhoid inoculations, express themselves with great positiveness as to the desirability of the use of the vaccine in civil life.

Considering the brilliant results obtained, the very slight inconvenience usually experienced following the vaccination, the atrocious number of cases of typhoid fever occurring yearly in both the city and the country, and the extreme complexity of the problem of lessening this attack-rate by sanitation, it is their firm conviction that all civilians should be advised to be inoculated against this disease. Naturally, they do not advise antityphoid vaccination as a substitute for proper sanitary control. When the extreme difficulty of coping with typhoid is considered, however, and the length of time it will require to attain the ideal of sanitation; and when one considers that even under the best sanitary conditions we still have to fear the typhoid carrier, direct contact and the danger of introduction from without by visitors and by citizens, the authors believe that antityphoid inoculation will have a place in the prevention of this disease in civil life, and that boards of health should not only advise the adoption of this measure, but should also distribute the vaccine free of charge for the immunization of the citizens of their respective communities.

(6) Jour. Amer. Med. Ass'n., Oct. 12, 1912.
(7) Jour. Amer. Med. Ass'n., Oct. 12, 1912.

Vaccination of Nurses. J. W. Brannan[8] reports the results of inoculations of 83 nurses with antityphoid vaccine. None of the inoculated nurses took the disease, although considerably exposed, while of seven who refused inoculation, one contracted the disease but recovered.

Extension to Civil Life. M. L. Ogan[9] discusses the theory of immunization against typhoid fever and advocates the adaptation of the army method to the population of a great community like the city of New York. He says that it is not unlikely that this movement will meet with considerable opposition. The health authorities would be content to induce physicians in charge of cases to immunize the families and give reports. They feel that it is incumbent on them speedily to place this great community in an approximate position to that enjoyed by the United States Army and Navy.

Scarlet Fever.

General Management. C. H. Phillips[1] calls attention to the following three points in the isolation of scarlatina:

1. Are our hospitals as at present constructed the most suitable buildings for dealing with the disease?
2. Is the period of isolation at present adopted too long?
3. Is it not better to adopt more open-air treatment in dealing with the disease?

In regard to the second point, in all mild and uncomplicated cases (that is, cases having no discharges), four weeks in the hospital is quite long enough, and waiting until all desquamation ceases is not required. If the proper and suitable provision has been made for isolating patients and treatment from commencement given to throat and nose and skin of a sufficient character to ensure thorough disinfection of these parts, then the latter stages of desquamation may safely be disregarded.

Milne says: "I do not isolate any patients in any

(8) Med. Record, Jan. 4, 1913.
(9) Long Island Med. Jour., June, 1913.
(1) Brit. Med. Jour., Aug. 17, 1912.

way; they are kept in the general wards of the hospitals, side by side with serious operations, and in the dormitories along with other healthy children; also I do not isolate measles or diphtheria, but rely entirely for scarlatina patients on treatment by swabbing the throat with 10 per cent. carbolic oil, and rubbing body all over with pure eucalyptus oil. And I get no return cases, although the children go back to school in ten days."

Desquamation continues long after convalescence has been completely established and temperature normal for weeks. The infectivity of scarlatina begins before desquamation commences, and may continue long after the process is completed—evidence that it is not essentially associated therewith but independent—that both are mutually independent. Huddersfield's period of isolation is 29 days under the new system; previously the average of 44.3 days.

From sixteen hospitals information was received to the effect that they could produce no definite evidence that desquamation *per se* was a source of infection, and that too much importance in the past has been attached to desquamation as a source of infection, and that experience did not support the popular view that a desquamating patient was necessarily an infective one.

From five hospitals the replies to enquiries were of a less definite nature.

Six hospitals still believe in desquamative infection.

Difficulties will be encountered in adopting this limited period of isolation, and will arise chiefly from the views held by the medical profession, who are always reluctant and unwilling to accept any innovation; and until the bulk of the profession can agree to give this system a trial it will be difficult to carry out. The medical profession will have to be relied on to help educate the minds of the laity to accept this change of opinion.

Dr. Caiger, who is the writer of the article on scarlatina in Allbutt's *System of Medicine* (latest edition, on p. 418), states: "Of recent years, the infectivity of the cuticle in the later stages of scarlatinal peeling has been

seriously questioned, and it is now the common practice of many physicians, whose wide experience entitles them to be heard, practically to ignore the peeling in its later stages and to discharge patients fit in other respects quite irrespective of its progress; and it is probable that for the majority of scarlatinal patients a six-weeks' isolation is quite unnecessary, and might be curtailed by one or two weeks."

Phillips agrees that with isolation properly carried out and suitable treatment given in the early stages of the disease, it is possible to allow patients out at the end of four weeks, and that the source of infection does not exist in the desquamating cuticle, but in the discharges from throat and nose, and that it is quite possible to turn out patients free from any infection in either of the two parts last mentioned. But to ensure this there must be greater purity of atmosphere in the wards, no overcrowding, more systematic segregation, and more open-air treatment.

Phillips' third plea is for the trial of more out-door treatment of cases of scarlatina after three weeks' isolation, and when there are no complications. If the patients are warmly clad, the more time they spend outdoors—either winter or summer, when the weather is fine—the better recovery they make.

Importance of Desquamation. F. H. Mead[2] expresses the following opinion on the question: Is the desquamatory stage of scarlet fever contagious?

Statistics show that in only a very small percentage of cases do secondary cases of scarlet fever arise from exposure to desquamation. Only a comparatively infinitesimal number of persons thus exposed catch the disease. Where the very few cases have developed from desquamation it is probable that the desquamation was infected from discharges from the nose, throat, or ears. We have not an official statement of quarantine for various diseases. The old-fashioned quarantine for scarlet fever, however, should go; and with no nasal, aural, or buccal complications, and no kidney involve-

(2) Med. Record, February, 1913.

ment, the time of quarantine for an ordinary case will be cut down to 28 or 30 days.

Return Cases. J. M. Day[3] emphasizes the frequency with which cases coming from a family in which a previous case has been treated in the hospital are referred to contagion after the return of the first patient to his home. This is frequently incorrect; the infection may easily have been acquired elsewhere, and should not be attributed to contagion from the first case unless not more than a week has elapsed since the patient returned from the hospital. This author holds the view that the chief source of infection in scarlatina lies in the throat and nose and to a certain extent in the otorrhea which so frequently follows severe cases. He also lays great stress on the fact that infection may be communicated by the breath for about a week after discharge from the infectious wards. Following these lines, his present procedure is to pay no attention to the peeling, but to rely altogether on the condition of the nose, throat, and ears. So long as there is any redness of the throat or nasal discharge, a child is not safe to be discharged. If the tonsils be enlarged they should be removed unless the parents object.

Dysentery.

Epidemiology. The epidemiology of bacillary dysentery is reviewed by C. J. Hunt,[4] who concludes as follows:

1. Bacillary dysentery should always be a reportable disease.

2. Sufficent power should be given to the health authorities to investigate and abate any suspected source.

3. Less confusion to the general practitioner results from a nomenclature broad enough to include all types of the causative organism.

4. While there is some warrant for the terms "dysentery" and "paradysentery," the more general one of "bacillary dysentery," in so far as preventive medicine

(3) Dublin Jour. Med. Sci., June, 1913.
(4) Jour. Amer. Med. Ass'n., Sept. 21, 1912.

is concerned, simplifies the problem both of diagnosis and of sanitary supervision.

5. There is apparently a notable lack of recognition of the etiology and probably of the pathology of cases infected by members of the dysentery group, resulting in a longer continuance of the infecting source and a higher mortality; this is evidenced in the varied diagnoses such as "diarrhea," "winter cholera," "intestinal grip," "grip," "gastric fever," "intestinal disorder," and many others.

6. Dependent on the casual association of the *B. typhosus,* outbreaks of bacillary dysentery may be followed within from ten to twenty-one days by a marked increase in the number of typhoid-fever cases. This occurred in five out of nine instances in Pennsylvania and may serve as a warning of the presence of the more serious infection; the immediate abatement of the sources would probably decrease the morbidity and mortality due to typhoid fever.

7. When it is recalled that the major number of cases of bacillary dysentery are mild in form; that sporadic cases probably exceed the total numbers occurring in epidemics; that sporadic cases probably account for the large proportion of deaths under 2 years of age accounted for statistically as cholera nostras, dysentery, diarrhea, and enteritis; that the disease is reportable in only seven states and territories; and that in the latter the law is not enforced, the only conclusion is that we have no definite collective information about the morbidity and mortality of the infection which properly should be called bacillary dysentery.

Poliomyelitis.

Facts About the Virus. The main facts regarding the virus of poliomyelitis are summed up by S. Flexner[5] as follows:

The virus stands midway in point of size between the finest and coarsest examples of filterable viruses. It passes readily through the more coarse and slightly through the finest filters. It is highly resistant to dry-

(5) Brit. Med. Jour., Nov. 9, 1912.

ing, light, and chemical action. In dust, especially within protein matter, it survives weeks and months; in diffuse daylight indefinitely, and resists the action of pure glycerine and carbolic acid in 0.5 per cent. solution for many months. When animal tissues containing the virus suffer softening and disintegration or disorganization by mould, the virus survives. Recovery from poliomyelitis in man and monkey is attended and produced by an immunization of the body. During this process microbicidal substances appear in the blood that are capable of neutralizing the active virus. This acquired immunity has, in the monkey, been reinforced by subsequent injection of large quantities of the living virus. Active immunity can be achieved by first injecting minute and later large amounts of the virus, and an adjusted mixture of immune serum and active virus will confer a beginning low active immunity capable of being heightened. Certain alien large animals, among which the horse and sheep are especially worth mentioning, are subject to immunization through injections of emulsions of the spinal cord and brain of paralyzed monkeys, and can thus be made to yield serums possessing microbicidal power, and capable of conferring, as do human and monkey immune serums, a degree of passive immunity. Thus far no immunizing effect has been accomplished with the dead virus. Unless some growth and multiplication take place no immunity arises.

He presents the following view of the mode of transmission:

The nasal mucous membrane is the site both of ingress and egress of the virus of poliomyelitis in man. Support for this view is found also in the study of the microscopic changes in the meninges and the central nervous tissues. Since the virus survives in the dried state it may be carried in dust; and in one instance it has been detected in sweepings from the room occupied by a person ill with poliomyelitis. Its distribution as spray in coughing and speaking is readily accomplished, and by this means both active cases and passive carriers may conceivably be produced. Still, one link in

the chain of causation of poliomyelitis as here outlined remained to be forged. The clinical evidence is strong in suggestion that human carriers of the poliomyelitic virus exist. The virus has now been detected in the secretions of the nose, throat, and intestine of persons suffering from abortive or ambulant attacks of poliomyelitis. The unrecognized examples of the abortive disease play a highly important part in the dissemination of the virus, through which the area of infection is extended, and the number of the attacked increased. A similar part has been accorded by clinical observation to the healthy virus-carrier, and the healthy carrier is the last to be detected, and his existence confirmed experimentally.

A tentative announcement has been made recently by Rosenau that the stable fly (*Stomoxys calcitrans*) can take up the virus from the blood of infected monkeys and reinoculate into healthy ones, which will become paralyzed. The experiment awaits confirmation and, after confirmation, convincing application to the circumstances surrounding infection in human cases of poliomyelitis.

Flexner calls attention to the fact that the employment for treatment of the immune serum, taken from monkeys and from human beings, exercises a definite, if not very strong, protective action on inoculated monkeys. Either the disease is prevented altogether or its evolution is modified in such a manner as to diminish its severity. When the virus used for inoculation is highly adapted to the monkeys and thus very virulent, it is more difficult to control the result than when it departs less from the original human type, and is less active.

The immune serum has thus far acted best when it was injected into the subdural space on several successive days. This is in conformity with the fact that, however introduced into the body, the virus establishes itself in communication with the cerebrospinal liquid, where it propagates for a time. After a time the virus localizes in the nervous tissue itself and becomes accessible not only from this liquid but, probably, from the

general blood also. The serum introduced into the subdural space soon escapes into the blood, and thus a double action is secured; on the one hand, it reaches the nervous tissue directly from the cerebrospinal liquid, and on the other hand with the blood. An immune horse serum at first gave disappointing results, but latterly its employment by intramuscular injection has given more promise. But none of the serums mentioned can be regarded as having more than touched the fringe of the problem of a cure for the disease.

The point of departure which Flexner and his associates have adopted is the drug hexamethylenamin (urotropin), which possesses a degree of antiseptic action in the body and is known to be secreted into the cerebrospinal liquid. When the drug is administered by mouth it can be detected by chemical tests in the liquid in a short time. When inoculation of virus and administration of the drug are begun together, and the administration continued for some days afterwards, the development of the paralysis is sometimes, but not always, averted. Hexamethylenamin lends itself to modifications by the addition of still other antiseptic groups to its molecule. They have tested a large number of such modifications, and have found certain ones to exceed the original compound in protective power, and others to promote the onset of paralysis. This is the common story of drugs. None is wholly without some degree of injurious action on the sensitive and vital organs of the body. But manipulative skill has already succeeded in eliminating the objectionable and improving the valuable features of drugs so that they exert their action but little on the organs and severely upon the parasites, when they become useful as therapeutic agents. This process may be called sundering the organotropic and parasitotropic effects. "Whether this can be successfully accomplished with this class of compounds can not be predicted. But if not, the quest will be transferred to still other drugs. When it is accomplished, the victory will be won. By whom will the victory be won, and when? Ours is the office of story-teller and not the vision of the prophet."

Smallpox.

Vaccination. J. H. Barach[6] explains a phenomenon which sometimes appears after an apparently unsuccessful vaccination. On re-vaccination, say about two weeks later, we do get a "take" and we are surprised to find that the previous vaccination, apparently unsuccessful, now becomes active and goes through the same evolution as the re-vaccination. The lesion of the first vaccination usually does not develop so fully in any of its stages as that of the re-vaccination.

All considered, in the light of our present knowledge of the subject, based on the evidences adduced, the best explanation for the lighting up of the first apparently unsuccessful vaccination, when the re-vaccination does "take," is that of local anaphylaxis.

The first inoculation results in the production of antibodies against the strange virus substance; it sensitizes the organism. At the second inoculation the virus, wherever deposited, is attacked by the antibodies, and in this attack certain "by-products" are let loose. These "by-products" act as poisons and produce the anaphylactic reaction. In this case the reaction is limited to local manifestations. In other instances, when the dose is large, or when the protein and antibody are diffused throughout the organism, the anaphylactic reaction is constitutional.

Diphtheria.

Antitoxin. In antitoxin administration W. H. Park[7] observes that the greater duration of immunity obtained in a recipient by the injection of antitoxin produced in the same species, is one of the strongest proofs that it is actually a cell-product. This is the reason that passive immunity in man is of short duration. It would be otherwise if the serum came from man instead of the horse. It has been proposed to secure active immunity by a mixture of toxin and antitoxin.

The difficulty with the practical application of this experiment is, that when we take a guinea-pig, or a

(6) Jour. Amer. Med. Ass'n, Feb. 22, 1913.
(7) Boston Med. and Surg. Jour., Jan. 16, 1913.

child who has no natural antitoxin, we must approach the danger line in the amount of toxin used to obtain immunity, and we would hardly dare to do this in the case of the child. You may have noticed that active immunity has been produced in man by passing tampons of cotton soaked in toxin into the nose. It is, as described, a somewhat wearisome process, and it is desirable to use only under exceptional circumstances.

The colostrum contains very much more than the milk, and the colostrum of women who have not had diphtheria has been found to be antitoxic. Infancy is protected from most of the common communicable diseases through this absorption from the colostrum during the first days of life, and more protection is obtained in this way than through the antibodies passing through the membranes before birth.

To prevent tetanus, Park would give 1,500 units instead of 1,000, as in diphtheria, because the tetanus spores entering with the dirt or clothing may survive a long time, and it has been found that a certain number of cases of tetanus developed from 12 to 14 days after severe crushed wounds. When there is risk of the infection continuing in the wound, he repeats the injection in 15 days. We have a repetition of immunity when we give the second dose, and can keep up the immunity just so long as desired by re-injecting at two-week intervals. The use of preventive doses has given brilliant results.

Authorities differ much as to the size of the dose. Park advises: Very mild cases, from 2,000 to 3,000 units for the first dose; moderately severe cases, from 4,000 to 6,000 units for the first dose; very severe cases, from 8,000 to 10,000 units for the first dose. Laryngeal patients according to severity were given from 3,000 to 5,000 units.

From all observations one is impressed with the belief that amounts of antitoxin beyond 25,000 units in a child and 50,000 in an adult are absolutely unnecessary and useless; and that an initial dose of 10,000 in a child and 20,000 in an adult is probably sufficient for the whole course of the disease.

Our object, therefore, as quickly as possible, is to get enough antitoxin into the blood to neutralize any toxin present there, so that no further toxin is able to pass out to the tissue-cells. We must also press the antitoxin out into the tissue fluids, and here we remember that the protein antitoxin passes through the capillary walls much more slowly than do the water and salts. The blood of the adult has, moreover, much less antitoxin per cubic centimeter than the child who received the same dose.

On the charts one notes the fact of the slow absorption of antitoxin when given by subcutaneous injection, and that a child or an adult gains from a single injection a greater and greater accumulation in the blood during the first three or four days.

Venereal Diseases.*

Individual Prophylaxis. Following the experiments of Metchnikoff and others showing that calomel ointment immediately applied is an efficient preventive of syphilitic infection, officers of the United States Army and Navy have attempted to make practical application to the prevention of venereal diseases. Single and double tubes and packages have been devised intended to prevent syphilis, chancroid, and gonorrhea. R. A. Bachman[8] describes a single tube of his own design intended to be applied immediately after exposure.

It consists of a collapsible metal tube holding 6 grams of 33 per cent. calomel ointment reinforced by 1 per cent. trikresol. The main feature of the tube to which the author ascribes its efficiency is a soft rubber nozzle 1.5 inches long which is inserted into the urethra and places the ointment well up beyond any possible area of infection and allows also a long time of contact with the ointment before it flows from the meatus. After a great many modifications the tube was brought to a satisfactory completion and the following experiments were made with it:

A patient having been confined in bed for a month

* See also "Industrial and Social Diseases," page —.

(8) Med. Record, Aug. 3, 1912.

with a fracture was given liberty. He reported gonorrheal infection a few days later. He had had no other liberty and named a certain inmate of a Newport brothel as the cause of his illness, and stated also that he had only exposed himself once very briefly and had taken the ordinary precautions such as washing, etc. This woman was easily identified from his description and slides made from the urethra, vagina, and cervix. All were positive. Ten exposures were obtained. All of them escaped infection save one man, about the middle of the series, and his case presents some interesting features. A few days after his exposure it was reported to the author that this man had taken a liking to the woman and repeatedly revisited her. The woman was interviewed, admitted his return engagements, and stated he had not used tubes at these times. The woman was cautioned not to use douches during the time of the experiment and was again examined at the conclusion. All three slides as before were positive.

The evidence of success thus adduced seems to confirm experimental results by Metchkinoff and others.

[The practicability of the method is quite another matter. The statistical reports show no notable effect on the incidence of venereal disease. Statistics showing a lessened rate of infection among those using the prophylactic are worthless because there is no evidence that those who escaped infection were actually exposed. Other serious questions are involved when the employment of this method in civil practice, is advocated. The suggestion of such a method to young men is likely to neutralize moral teaching and lower the standard of sexual morality. Like segregation and examination of prostitutes, it is likely to create a false sense of security. Whether the prospects of prevention by such a method are sufficient to overcome its objectionable tendencies and justify placing the material in the hands of the laity is a matter for serious consideration.—Ed.]

Notification of Venereal Diseases. H. M. Biggs[9] describes the attitude of the Department of Health of the City of New York in relation to venereal disease. The

(9) New York Med. Jour., May 17, 1913.

board of health requires notification of these diseases and provides for the making of the Wassermann test for syphilis, the complement-fixation test for gonorrhea, and for the examination of fresh smears for spirochetes and gonococci. Notification is required from all hospitals and other public medical institutions, and is requested of other physicians, except that name and address need not be reported. The information thus obtained is held strictly confidential and such records are not deemed public records. The author summarizes the situation as follows:

It may be briefly said that the policy of the department of health toward these diseases, at present, comprises the following:

1. The development and extension of the system of registration as at present conducted.

2. The provision of adequate facilities for the early diagnosis and general supervision of all forms of venereal disease.

3. The institution of an extensive campaign of education in relation to sex hygiene, and the causes, prevalence, danger, and the results of such infections and the means for their prevention and treatment.

4. The provision of hospital accommodations for such persons as constitute a menace or who can find no facilities elsewhere for their care.

It is the firm conviction of those who have given much thought to this subject that by these and other similar measures, which may be later developed, a very important decrease may be brought about in the amount of sickness and death directly or indirectly produced by the venereal diseases.

Municipal Clinic. J. Rosenstein[1] describes the municipal clinic of San Francisco and formulates certain requirements for the success of modern institutes for the sanitary regulation of prostitution; the following would be fundamental:

1. Prostitution, if regularly and officially supervised, although morally and socially abhorred, should not be

(1) Med. Record, March 15, 1913.

punishable criminally; its regulation should be left to municipalities or counties.

2. The display of a spirit of helpful, dignified sympathy by the institutional officers and employees for the unfortunates who come under their administration.

3. A persistent effort to educate the clients of the institution to the perils of their trade, to the methods of their avoidance, and to an appreciation of the institute's beneficial services for their protection.

4. The inculcation of self-dependence by charging a small examination fee, sufficient to maintain the expenses of the institution and thereby insuring free and private medical, ambulatory, and unlock hospital treatment. This could be so arranged as to have the landladies assume part or all of the charges.

5. A police detail attached to the institution for surveillance and rounding up of delinquents by specially fitted officers.

6. Control of examination to be helped by cards similar to ours affixed in the private rooms of houses of prostitution calling for inspection of certificates of examination by the visitors, but disabusing their minds as to a possible feeling of safety.

Rosenstein firmly believes that if institutions for the sanitary regulation of prostitution were established and carried on along these lines throughout our country, the number of infections with venereal diseases would be materially lessened, the injuries as well as the opprobrium resulting from the existence of prostitution greatly diminished, and a class of human beings benefited for whose debasement and degradation our vaunted civilization must be proclaimed chiefly responsible.

[In the opinion of the authorities this clinic did not fulfill its purpose and for this reason has been given up.—Ed.]

INDUSTRIAL AND SOCIAL DISEASES.

Beri-beri. Previous investigations have shown that beri-beri is caused by some element of the diet, particularly the kind of rice which forms so large a part of the diet of the people most subject to this disease. Much

speculation has arisen as to whether the offending substance is something inherent in rice generally, or in particular forms of the grain. It has been concluded by most investigators that the fault lies in the use of polished rice, and a long series of experiments has enabled H. Fraser and A. T. Stanton[2] to affirm that the etiology of the disease is connected with the removal of some substance from the rice by the process of polishing. Whether this substance acts by making other foods available for nutrition, or whether it is itself the nutritive agent necessary for nerve tissue, is not known.

In order to test the power of this substance to prevent beri-beri, the authors experimented on fowls fed with polished rice until a polyneuritis appeared, and subsequently fed on an extract of rice polishings together with polished rice. These fowls recovered from the disease. In another set of experiments fowls were fed on polished rice and developed polyneuritis, while another set fed on the same food plus the extract from rice polishings. The latter set remained healthy.

The supposed active agent was extracted from the polishings previously freed from fat, by the use of alcohol and further purified from substances insoluble in water, especially from traces of fat.

Hygiene of Athletics. H. Brooks,[3] while recognizing the advantages derived by college students from athletics, calls attention to the ultimate results in after-life. He considers it almost an axiom that the best qualification for the strain and contest of modern life is good physical health. Without this, even success itself is a bauble of little value; with it, all is possible and all may be appreciated when achieved. The healthy, logical mind occurs but rarely and quite sporadically outside the healthy body. Brooks proposes the question: Does the physical training of the college athlete better fit the business or professional man for his after-life?

During one year Brooks examined twelve different men, all at one time famous as college football players, and six of them ex-captains of their teams. These men

(2) Lancet, Oct. 12, 1912.
(3) Amer. Pract., November, 1912.

were subjected to the same work and physical tests as those men who had passed through their college course without any particular athletic distinction or who had never enjoyed the opportunities of college life.

Of these twelve famous athletes but one could be rated physically up to the average of his comrade of his own age. This one exception was a Yale alumnus, who has since died in his early thirties of acute diabetes mellitus.

The author has found similar conditions pertaining in regard to other college sports, and the defects become even more marked in trackmen, and especially in oarsmen. They appear perhaps in the least degree of all in baseball players.

The distinguished college athlete after ten years of severe business life is physically below the average college man in his physical possibilities and in the measure of his resistance against disease. He may even fall below the level of the entirely non-athletic man. The defects observed are chiefly confined to lesions or disturbances of the heart and other circulatory organs, to adiposity, or to joint disease. The explanation is that hypertrophied muscle when no longer used degenerates.

If the former demand be above the normal, the descent and degeneration is all the more rapid and disastrous in its effects. The over-development of any part or function of the body is always at the expense of some other part. If the muscle tissue be hypertrophied, the kidneys and the liver must be accordingly increased in function in order to excrete and to carry on the metabolism for this "sport." Other organs must accordingly suffer. This is a law of Nature, simple in its working but inexorable in its effects.

Degeneration in the case of the muscle tissues, which are among the more simple to be understood and the most important to consider in our problem, may occur in three ways, singly or in association. It probably proceeds most frequently by a fatty degeneration or substitution, by simple atrophy, and by replacement from the formation of scar or fibrous tissue. Either

gives a great reduction in the power of that tissue, and is practically permanent in its effects.

When the high nutritive supply of hypertrophied muscle is no longer maintained, the loss and deterioration of that tissue is proportionately rapid. The larger, the more active the muscle, when its nutriment is cut off, the more rapid is its degeneration.

Thus we find that in the specialized development of the college athlete there are very excellent physiologic reasons why deterioration takes place more rapidly in his tissues than in those of an average man, when once the accustomed activities of those muscles (and this applies with special grave significance to the heart muscle) is diminished or cut off. Furthermore, this hypertrophy, again referring particularly to the heart muscle, is especially liable to be carried on to a highly pathologic degree, since it occurs during the adolescent growing years; the reactionary degeneration is therefore proportionately all the more marked.

Is there, then, no way by which the enormous advantages of college athletics may be realized without these after-defects which may hamper or ruin the adult life of many living under modern normal and obligatory conditions? Its secret is a warning against over-specialization in athletic work, the making of records while the body is still in its growing period, when an unbalancing of growth and development may readily be induced. Physical training and development must take place along slower and more general and more normal lines; it must be designed toward the evolution of a strong, proportionately capable human body, not to the production of a human imitation of the greyhound or buffalo. When this is realized and the effort is made not to create abnormal records on the college athletic field with bodies as yet young and normally immature, but to send out of college men physically as well as mentally qualified and equipped to grapple with the necessary vigors of business life, then the oft-heard tale of athlete's heart, or over-strained kidneys, or of general physical breakdown, will become less familiar to the physician, who now views the after-life of the college

athlete with anything but cheerful favor. We must learn to secure in college athletics the greatest possible benefits for the many and without the great defects for the few. In athletics, as in education, the college should equip and prepare for the most efficient life, and not strive for immediate scholastic or athletic records.

Influence of Athletics. H. S. Pettit[4] emphasizes the importance of athletics as a factor in sex hygiene. He regards athletics as an education both physical, mental and moral. According to his experience for seventeen years in conducting summer camp work with boys ranging from 8 to 25 years of age, he has found a wonderful change as a boy becomes fond of healthy sports. He becomes more manly, more alert and wide awake, a hero worshipper of a strong, healthy, virile manhood. He quotes Dr. Grassman of Munich, who says: "The backbone of the sexual training of the individual is and remains the formation of character. More energy must be thrown into our efforts in this direction. Sexual pre-occupation of the mind must be antagonized on the principle of displacement. The readiest means for this purpose are body exercise and rational physical training."

Sex Hygiene.

Elizabeth B. Thelberg[5] describes the instruction of college students in regard to reproduction and maternity at Vassar College.

She tells the students plainly that no man leading a promiscuously licentious life ever escapes gonorrhea, and rarely syphilis; that however much of repentance he may bring to his marriage, he brings, as a rule, after such a life, an infected body; and, furthermore, in the case of one of these diseases, an infection which may transmit itself not only to an innocent wife, but to children as well.

These lectures are not easy to give. The author feels as if they were at once the most important and hardest part of the year's work. A slight error in taste and

(4) Long Island Med. Jour., June, 1913.
(5) New York Med. Jour., June 15, 1912.

judgment would nullify much of the good that one fain would do.

No amount of information can compensate for a loss of the sense of decency. Above all things, such lectures must not be touched with the taint of sentimentality. Neither should they be made purely, coldly, inhumanly scientific. The human touch, now and again a touch of humor, should lighten up the profound seriousness with which youth is so prone to take all its problems.

Is it not possible that the pendulum may swing too far away from the old and harmful reticence, and the fastidious and critical mind of adolescence be offended by undue detail, and the few prurient-minded be stimulated to unclean curiosity? It is the golden mean we are all seeking. How high and difficult of attainment it is, only those who try unceasingly to reach it know.

Overcrowding. L. Veiller[6] finds the causes of overcrowding in poverty or high rents or in greed, which lead to the taking of lodgers, and in race solidarity, which leads single men of a certain nationality to seek rooms with families of their own race. Previous attempts to combat the evil have been ineffective because directed to the tenants who especially profit by taking lodgers. Veiller's solution for this evil, therefore, is that we hold the landlord primarily responsible for the taking of lodgers into the apartments of families who occupy his building.

He proposes the following provisions to be incorporated in all housing laws and also adopted by health departments as part of their sanitary codes:

"No tenement house, nor any part thereof, shall be used for the letting of lodgings without the consent in writing of the board of health, nor shall any person not a member of the family be taken to live within an apartment occupied by any family, without such consent. It shall be the duty of the owner of such tenement house to see that the provisions of this section are at all times complied with, and a failure so to comply on the part of any tenant, after due and proper notice

(6) Jour. of Health, March, 1913.

from him, shall be deemed sufficient cause for the summary eviction of such tenant and the cancellation of his lease."

With a provision of this kind on our statute books, the methods of administration to be employed will be comparatively simple. From the point of view of the enforcing officials, what will be required will be in the first place a very complete notification to the owners of all tenement houses of the new requirement and a warning that the responsibility now rests on them and that any deviation from the strict letter of the law in this regard will be rigidly punished in future. The health department will also be under the necessity of having initial inspections and measurements made of all rooms in those portions of the city where they expect the evil is most likely to occur, so that they may have on file in their own records, in convenient form, readily accessible, the exact number of adults and children who may be permitted with safety to occupy each individual suite of rooms. Following this measurement, written notice should be sent to the owner informing him of the maximum number of persons who may be lodged in the individual apartments of his building, and calling his attention to the fact that no persons except those to whom the apartments are let may be taken to live there without the consent in writing of the health department.

Then, from time to time, night inspections would have to be made by the health officers, and, where it was found that lodgers were being taken, court proceedings would have to be instituted against the owner. Presumably, it would be wise policy, in the first instance, to warn him and to threaten court proceedings in the next case that occurred in his house; then keep a very close watch upon his property.

The landlord should prohibit in the lease subletting without permission, and on notice from the health authorities he should evict the tenant. Two points of vital importance must not be lost sight of; one is something that we are apt to forget, namely, that the tenement dweller knows that it is wrong to take lodgers. Veiller is sure that social workers, housing reformers

and health officials have uniformly been made aware of this in their dealings with tenants.

The other vital point is that we can not succeed in this effort unless we see to it that the community is thoroughly aroused to the evils of room overcrowding and is kept aroused; not only must we educate the general public, but we must give especial attention to the education of our minor courts. The judges before which cases of this kind must go must be made to see at first hand the serious consequences of this evil.

The establishment of municipal lodging houses is urged. Here there is great opportunity for our philanthropists. It is pioneer work; the ground has to be broken from the very beginning. We have yet to learn what is the best type of lodging house to build; the whole question is still to be studied in all its aspects.

Drunkenness. In discussing the problem of drunkenness, H. Neff[7] points out that the inefficiency of the present system of caring for cases of drunkenness has created a popular demand for a better and more discriminating method of handling (1) those cases of drunkenness which are constantly appearing in our courts; (2) the victims of alcoholism who voluntarily subject themselves to treatment.

The medical profession has awakened to a realization of the fact that the problem of drunkenness is primarily a medical problem, and properly belongs to a branch of medical social work which has heretofore been neglected. The interest in this subject is shown by the attitude of many states which are considering legislation which will give state care and treatment to the inebriate.

It is the consensus of opinion that any plan put into execution for the control of drunkenness should be directed by states or municipalities. For obvious reasons state control is preferable, and should be strongly advocated.

Any method for the treatment and control of confirmed drunkenness, to be practical and wide-reaching, must recognize that (1) a comparatively small percent-

(7) Boston Med. and Surg. Jour., Dec. 26, 1912.

age of users of alcohol are confirmed drunkards or inebriates; and (2) the appropriate care of the alcoholic implies both curative treatment and custodial care. The curative treatment should be directed to the case which is likely to be benefited, the custodial, for economic reasons, should be directed to the recidivist, constantly appearing in the courts. Such a differentiation must eventually be made and appropriate segregation of these two types established.

There are two widely opposite opinions of drunkenness. The believers in the theory that drunkenness is a disease declare the alcoholic irresponsible and demand that he be segregated and compelled to submit to enforced detention and compulsory abstinence. The adherents to the habit theory suggest punishment in some form for the offender against society.

Observations made at the Massachusetts Hospital for the Treatment of Inebriates during the past four years justify conclusions as follows:

1. Inebriety is the expression of nervous weakness; founded on this weakness is a habit, which we call drunkenness.

2. The antecedent weakness is either acquired or in the nature of an inborn defect.

3. The nature of this nervous weakness is as yet not accurately defined; it appears to be closely allied to degeneracy and related to minor functional nervous diseases.

4. The inebriate is, as it were, a sum total of his personality and the symptoms attributable to alcoholism.

5. Inebriety should be considered a disease in the sense above described. The acceptance of this theory implies responsibility on the part of the inebriate, although it admits of extenuating circumstances.

6. There is no known drug which can permanently eradicate the desire for drink.

The inebriate is a personal equation, each case a personal problem requiring for its solution individual consideration and treatment. It should be remembered that the correct and ultimate solution of such a problem rests largely with the patient, who by his own

efforts must coöperate in the educational measures carried on at the hospital. Any correctional measures imposed or any medical treatment instituted which is finally opposed by the patient, must necessarily end in failure.

Neff advocates a combination of hospital treatment with judicious after-care and farm colonies for certain cases.

Massachusetts has had for twenty years an institution for the treatment of inebriety. Those in charge, realizing the greater needs of extension of treatment and the defects of the present hospital, have secured legislative action and have been granted appropriations which have allowed for the purchase of land and will allow for the erection of buildings which will care for both the hospital, or hopeful, case and the recidivist, who properly belongs in the custodial group. The most obvious needs for the proper constructive treatment of the inebriate are as follows: 1. Sufficient land for agricultural development. 2. Sufficient accommodations for industrial training and workshops. 3. An opportunity for segregation of the diverse types. 4. An opportunity for the treatment of both sexes.

The experience of Massachusetts warrants us in declaring that the colonization of the inebriate and drug habitué, thus far carried out, is elastic and permits of differentiation, segregation and individualization, which are essential factors in carrying out the proposed plan. As a necessary adjunct to this scheme, particular mention should be made of the Massachusetts State Farm, which has for a considerable period of time successfully cared for cases of drunkenness sent there by the courts on indeterminate sentence.

The new hospital in process of erection will receive patients who come voluntarily or who are committed by the court on application, under the existing law. Second, young habitual drinkers, placed on probation by the court on condition that they spend a specified period at the hospital. Third, suitable cases transferred on parole from the detention colony. The department for women would receive, first, patients who come voluntarily or are committed on application; second, cases placed on

probation by the court on condition that they spend a specified period at the hospital.

The detention or custodial colony, widely separated from the hospital colony, would receive non-criminal habitual drunkards from the courts on indeterminate sentence or commitment.

Occupational Diseases.

Industrial Poisoning. E. P. Buddy[8] discusses the poisonings arising from industry, particularly lead and phosphorus, and also the diseases, the development of which is favored by conditions prevailing in the various trades. He presents a table giving the mortality rate from various diseases in different occupations.

The conclusions from the foregoing table are:

1. The boot-and-shoe industry has the largest percentage of deaths from tuberculosis of any St. Louis industry, while factory workers rank second and office workers third.

2. The lowest average age at death from tuberculosis, among factory workers was 28 years.

3. There are 10 per cent. more deaths from tuberculosis among indoor workers than there are from all accidents, including those accidents which have no relation to occupation, as street railway, railroad, suicide, homicide, drowning, etc.; and this ratio is reversed among the outdoor workers, who show 5 per cent more deaths from accidents.

4. There are 10 per cent. more deaths from tuberculosis among indoor workers than among outdoor workers, while there is no particular difference in the other causes of death.

5. The percentage of tuberculous deaths among indoor workers is 10 per cent. greater than among average white males, while the percentage of other causes is less.

6. The professional class has the lowest death percentage from tuberculosis, while it has the highest from other causes, save accidents.

7. The unemployed have the largest percentage of deaths from accidents.

(8) Jour Mo. State Med. Ass'n., March, 1913.

Brass-Poisoning. E. R. Hayhurst[9] devotes an interesting article to the discussion of brass-poisoning and concludes with the following summary:

1. In a broad sense, the brass industry includes all non-ferruginous metal-working trades; there are sixty or more common alloys (brass, bronze, German silver, type-metal, etc.). The proper physical properties are produced by combining with zinc varying proportions of other metals, as copper, tin, lead, nickel, antimony, phosphorus, etc.

2. Strictly speaking, brass is a compound of copper and zinc (lead, a trace to 7 per cent.). Bronze is a compound of copper and tin (some zinc, also lead).

3. There is no peculiar poisoning due to trauma from brass or the industrial exposure to brass dust, as among polishers, but greenish discolorations of the skin, hair, gums, etc., may occur, due entirely to the copper constituent.

4. Occupational brass poisoning or brass-founders' ague is a malaria-like complex of symptoms with certain limitations as regards occurrence, severity, susceptibility, and effects, found to occur chiefly among brass-founders, but also in all confined places where zinc is heated to the volatilization point and the resulting sublimation products inhaled.

5. This malaria-like symptom-complex is peculiar to the human being. As a rule, its severity is in proportion to the concentration of the zinc in the alloy.

6. There is no definite pathology, but continued exposure appears to be followed in time by chronic systemic affections (respiratory, digestive, urinary, and nervous). Zinc is found in the urine and feces.

7. The affection is very little known to physicians because it is never immediately fatal, its course is brief and self-limited and an apparent but fleeting immunity is soon established in most persons. The affection was first distinguished from malaria by Thackrah, in England, in 1830. The entire literature on the subject to date is scarce.

8. The exact etiology is disputed. It was long thought

(9) Amer. Jour. Med. Sci., May, 1913.

to be a copper poisoning, or an alloy poisoning, also due to other metals. Lehmann first produced the symptoms in man by burning chemically pure zinc. "Resorption of cell contents which have been destroyed or changed by zinc in the respiratory tract may be the cause of the peculiar malady."

9. Recent observations show it probable that the symptom-complex may be produced by the inhalation of the volatile products of other metals. The malady has always been associated with zinc, however, because zinc is the only supposedly innocent metal whose boiling point is commonly reached in the industries.

10. Recent perfections in the tests for zinc have enabled us to trace zinc through the lungs, liver, and kidneys of the rabbit exposed to the inhalation of brass fumes.

11. The hygienic and working conditions were investigated in 89 brass foundries and 3 large zinc smelters in Chicago and vicinity in 1910 by a State Commission, with the following findings:

(*a*) The large majority of these plants were without proper ventilation. Numbers of workers were also needlessly exposed to brass and zinc fumes.

(*b*) Workers invariably ate within the foundries, the noon hour was only thirty minutes, washing facilities were inadequate, the piece-work system prevailed (ten hours per day), and exposure to lead and its fumes, carbon-monoxide vapors and burnt oil odors were nearly universal conditions.

(*c*) Unskilled labor (Eastern Europeans) constituted 90 per cent of the employees.

(*d*) Workmen were found in half the plants who were or had been the subjects of brass or zinc chills.

(*e*) About one-third of the officials consulted acknowledged the existence of these chills, but considered them of minor significance.

(*f*) Brass or zinc chills were far more prevalent in the winter season (natural means of ventilation curtailed).

(*g*) Large, well-ventilated plants or those provided

with special means of artificial ventilation were seldom the site of the occurrence of these chills.

(*h*) Alcoholism was exceedingly prevalent, excited by chronic respiratory irritations. Undoubtedly it was the cause of much incapacitation, although traditionally antidotal to the effects of fumes.

(*i*) Trade-age-limit statistics showed: Only 17 out of 1761 men over 50 years of age and approximately 85 per cent. under 40 years of age. Officials claim that the older workmen become too slow and undependable. The workmen claim that they are gradually incapacitated by the continued inhalation of fumes and vapors. The conditions are not so among iron-moulders, an analogous trade.

12. Prevention (is all-important since there is no antidote or hardly a palliative for the zinc-chill syndrome): Restrict certain persons from the trade. Prevent the inhalation of metallic fumes as (*a*) by confining the fumes to certain quarters, (*b*) by insuring rapid ventilation, and (*c*) by coöperation on the part of employees through instructions.

13. Following the report of the Commission the Illinois Legislature adopted a special occupational disease law effectively covering the hygiene of this and similar trades. Statistics show that by similar means Germany has materially increased the trade-age-limit in this industry in recent years.

GENERAL SANITATION.

Water Supplies.

Lake and River Traffic. In discussing the prevention of water-borne disease in lake and river traffic, A. J. McLaughlin[1] classifies the sources of water supplies which may transmit disease.

1. The lake or river itself.
2. Water tanks of the vessel.
3. Public water supply at ports of call.

The rivers and lakes used as highways of commerce are usually polluted to such an extent that their use in

(1) Boston Med. and Surg. Jour., Dec. 12, 1912.

the raw state for drinking purposes is decidedly dangerous. The water of any navigable rivers is probably unfit for drinking without purification throughout its entire navigable length. The water in the Great Lakes because of the enormous storage is relatively pure at considerable distances from shore.

Lake Superior. The water of Lake Superior is of excellent quality and safe for drinking purposes if it can be drawn from a point beyond the zone of pollution which surrounds the water front of the cities. In this deep lake the place of intake would often present engineering difficulties and necessitate expenditures which would be in excess of the cost of other methods of rendering the water safe.

Lake Huron. As a source of water supply Lake Huron is ideal. It is deep, empties slowly and is in little danger of pollution from the communities on its banks.

It would take *Lake Michigan* many years to empty itself at its present rate of outflow if all inflow were prevented. Under these circumstances the quality of Lake Michigan water must be good, provided we can get it far enough from the polluting inflow of rivers and sewers. Unfortunately, the zone of polluted water extends a considerable distance out into the lake from the water fronts of the cities and the mouths of the large rivers, and this zone of pollution has no constant boundaries because of currents due to wind and flood, but extends under unusual weather conditions far beyond the point which seems safe in quiet weather.

Lake Erie. The importance of Lake Erie as a source of public water supply can not be over-estimated. This great natural reservoir, with capacity for 920 days' storage, assures a high degree of purification by natural agencies, such as dilution, aëration and sedimentation, besides affording the storage time necessary to permit of the natural death of pathogenic bacteria. The zone of polluted water is wide and increasing. The danger of polluted water entering water-works intakes is increased by the action of currents, which renders the boundaries of the polluted zone extremely variable.

Lake Ontario. Lake Ontario would require 2,337 days, or over six years, to empty itself if all inflow were stopped. This means that the water in Lake Ontario is capable of purifying an enormous amount of organic matter and that with the existing pollution the water should be pure outside of the zones of pollution surrounding the water fronts of cities and the mouths of large rivers.

The connecting rivers between the Great Lakes are all polluted by sewage, and their currents and length are such that natural purification is ineffective and does not render them safe as sources of supply without further treatment.

It is a very difficult matter to restrain ignorant or careless individuals from drinking unfiltered surface water. These people cannot be restrained by law or regulation. The only remedy is a campaign of education showing the dangers of untreated surface supplies.

The water tanks of vessels may and often do contain polluted water. The river steamers often carry water obtained at some of the ports of call or may fill their tanks from the river itself. The lake steamers frequently take their supplies from the midlake, where the water is comparatively pure. That they do not always do this is attested by at least one very serious outbreak of typhoid fever on a lake steamer.

Another danger exists in the use of foul sea cocks and pipes. It is frequently the custom to use the same system of sea cocks and pipes for drawing the polluted water from harbors and rivers while in port and for filling the water tanks in midlake.

Not only are the public water supplies of ports of call frequently the source of supply for vessels, but they are also made use of by the interstate visitors who land in such ports. They may be contaminated because of lack of sufficient purification.

There is also too much confidence placed in unfiltered surface supplies from inhabited water sheds. Even where there is alleged control of the watershed and ample storage, pollution may occur.

Filters may be inefficient or improperly managed. Probably the greatest single cause of a poor product from filter plants is inefficient operation by unskilled men. It is absolutely essential for good results that bacteriologic examination, including *B. coli* estimation, be made at least once daily, and in slow sand plants from each unit separately. The most serious defect in sanitary control of our water supplies is the lack of proper daily bacteriologic examination of the water and quantitative estimation of the *B. coli* content.

To prevent water-borne disease in lake and river traffic it will be necessary to proceed along the following lines:

1. Popular education is necessary to prevent drinking of unpurified surface water.

2. Public water supplies in communities engaged in interstate traffic should conform to United States standards.

3. United States standards should be based on the bacterial count and the quantitative estimation of *B. coli* and should be the minimum requirements to prevent the spread of disease, such as typhoid fever or Asiatic cholera in interstate traffic, the various states retaining the right to impose additional requirements, consistent with state laws where such laws exist.

4. United States regulation is necessary, requiring vessels engaged in interstate traffic to fill their water tanks with distilled water or from public water supplies certified as safe and conforming to United States standards.

5. Inspection of vessels by United States officers and by state and municipal officers duly qualified to enforce this regulation.

Pollution of Waterways. C. A. Hodges[2] states that in Canada, sanitary authorities have been directing their attention to the prevention of the pollution of waterways and their tributaries. At present, four of the provinces of the Dominion have made it impossible for municipalities to continue the defiling of rivers and lakes by making them receptacles of untreated sewage.

Where international waterways are concerned, the

(2) Buffalo Med. Jour., January, 1913.

problem is a complex one. The chief offenders are naturally the more numerous towns and cities to the south of the boundary line, although it is simply a difference in degree as regards the quantity of pollution, nothing more; for the citizens of both Canada and the United States are guilty.

Health authorities in Canada are unanimous on the question of the prevention of pollution, not only because they hope to secure for municipal authorities pure water reservoirs from which they may obtain palatable waters, but because they believe that municipalities in their own interests should not continue to make these reservoirs the receptacle for raw and untreated sewage, thus wantonly making them the sources of disease and death to many thousands who either innocently or compulsorily use the same.

As regards the disposal of sewage by lake and river steamers, the most stringent rules should be adopted and rigidly enforced by the proper authorities to prevent the indiscriminate pollution of these waters. At the same time the water supply should be taken only from known sources that are certified to be pure.

The only way these international waters can be safeguarded and the public protected, is by a coördinated movement of Federal, and State or Provincial authorities.

Interstate Waters. As the result of eighteen months' study of the problem of sewage pollution of interstate waters with special reference to the spread of typhoid fever, A. J. McLaughlin[3] presents certain fundamental facts:

1. The primary necessity from a sanitary point of view is safe water-supplies 365 days in the year without waiting for the solution of sewage-disposal problems.

2. In spite of the most elaborate methods of sewage purification, pollution of these waterways will take place at certain times, so that sewage purification can not be considered a substitute for the inevitable purification of water.

3. Because of winds and currents, floods and thaws, the boundaries of the zone of shore pollution are con-

(3) Jour. Amer. Med. Ass'n., Oct. 19, 1912.

stantly changing. The only way to secure safe water every day in the year, without unjustifiable expense, is by some method of water purification.

4. Sewage purification may often be an aid and sometimes a necessity to improve the quality of the raw water, but will rarely, if ever, make one of these surface supplies absolutely safe. For this reason it must be considered as secondary to water purification in preventing water-borne diseases.

5. The use of streams for sewage disposal within permissible bounds is an economic advantage, and absolute prohibition of this use is unjustifiable.

6. This use of streams is sound in principle and safe in practice when proper restrictive control is exercised.

7. The permissible limit of pollution of each river, lake or waterway can be fixed only by careful study of the waterway, and of the uses which must be made of it and to which it is best adapted.

8. Although prevention of all pollution is impossible, control of pollution is feasible and imperatively necessary. The absolute prohibition of discharge of sewage into these waters is scarcely justifiable and the legality of such legislation would be extremely doubtful.

9. The discharge of sewage should be under control and permitted when possible for economic reasons within certain limits. The permissible limit of such reasonable use should be fixed by official standards of the raw water after a careful sanitary survey and consideration of the purposes for which the waterway is necessary or available.

10. These official standards would have to be made for each problem separately and independently, it being manifestly impossible to attempt to fix any general standards of raw water to cover all cases. The acceptance of these basic facts will tend to prevent unjustifiable generalization in a problem in which each city is a law unto itself. By allowing a reasonable use of these interstate waters in the reception of sewage or sewage effluents subject to such restrictions, coupled with water purification which will amply protect the public health, the more intensive processes of sewage purification may

in many cases be avoided. A city may thus be saved a very great expense which could only be justified on sentimental and not on practical grounds.

Lake Michigan. From a sanitary survey of Lake Michigan along the Wisconsin shore, E. J. Tully,[4] chemist of the State Hygienic Laboratory, Madison, reaches the following conclusions:

The water of Lake Michigan along the Wisconsin shore is not at all times a safe source of supply. The water is polluted and at times quite heavily so, even out to a distance of seven miles from shore. The chemical and bacteriologic data conclusively indicate that there are no uniform currents in this portion of the lake, and that sewage once deposited in it may be carried in any direction, depending on the direction and force of the wind.

It is indeed as fallacious to assume that the discharge of sewage into the lake in a given direction relative to the location of the intake pipe will afford the necessary protection to a water supply as it is erroneous to presume that the extension of the intake pipe to two or three miles from shore will ensure a safe supply. The sewage from any one point along the shore may be carried over the intake of any of the water supplies when the wind and current are in the proper direction, and for this reason the abatement of any one nuisance will not afford a great measure of relief, as the remaining sources of pollution will be sufficient to render the water unsafe.

The extension of the intakes a few miles from shore will certainly not provide at all times an adequate protection against impure water, because the results definitely establish the fact that the zone of pollution extends at least seven miles from shore.

During the last few years the conservation of natural resources has been one of the chief endeavors of our scientists and engineers. Its principles should be applied to the case in hand. The character of the water of Lake Michigan is so well-adapted for domestic and industrial uses that cities along its shore can not afford

(4) Cleveland Med. Jour., November, 1912.

to pollute and destroy it as a water supply, and in order to re-establish its purity it is essential that the discharge of unpurified sewage and industrial waste be stopped and that all other sources of pollution be abated as much as possible.

As a result of these studies one of the principal questions which suggests itself is: What is the remedy for this trouble and what methods of purification should be adopted? This question can only be solved after a careful study of the costs involved. There are obviously several courses open. Either the sewage may be purified by one of the methods of filtration or by a suitable combination of methods of disposal, or sterilized, before it is discharged into the lake; or the water supplies may be filtered; or methods of purification of both sewage and water may be established. There is also the problem of extension of the intakes; but so long as sewage is allowed to be discharged freely into the lake, the extension of the intake is but a temporary expedient, for the pollution is always being driven out in greater amounts. In order to escape pollution and to ensure a safe supply of water it would be necessary to extend the intake to a distance of from twelve to fifteen miles from shore; but such an undertaking would be impractical. Estimates show that to adopt filtration is cheaper, to say nothing of the greater safety secured.

It is possible with modern methods of sewage purification by filtration to secure an effluent which is safe to drink; but the method is relatively quite costly. Provably the most economical and efficient procedure would be filtration of the sewage, using trickling filter beds in order to obtain organic stability and partial bacterial purification of the effluent, and subsequently to disinfect the effluent with calcium hypochlorite in order to remove pathogenic organisms. Chemical disinfection alone offers a means whereby a high bacterial purification may be accomplished without complete purification of the organic matter, but in no sense is it a substitute for sewage purification as ordinarily understood; for, though the application of hypochlorite to an effluent oxidizes the organic matter in it to some extent, and

thereby increases its stability, such improvement is only incidental.

In conjunction with sewage purification, filtration of the water should be undertaken by municipalities deriving their supply from the lake. It will only be a few years before the lake water will have to be filtered because the necessity of and demand for filtration is constantly increasing. Filtration is easily possible at moderate cost. In this case the evidence indicates that mechanical filtration would be both efficient and economical, as the water is sufficiently hard. In connection with the matter of filtration it is desirable to point out that it is extremely important that such a plant when built should be properly operated.

As a temporary expedient, prior to the installation of filtration plants, it would be desirable to treat the water with hypochlorite of lime, and thus ensure a safe supply for the time being. Only a small amount of hypochlorite is necessary, about four to five tenths parts per million of available chlorine will suffice to remove over 99 per cent of the total bacteria present.

In conclusion, it is believed that the solution of the problem is the filtration of the lake water and the purification of sewage before it is discharged into the lake.

No single municipality can hope adequately to handle the situation. The problem of supplying permanently safe water can only be solved by the concerted action of the cities along the shore, and possibly aided by the state.

Evidence of Sewage Pollution. A. C. Houston[5] discusses the value of the test for *B. coli* as an evidence of sewage pollution in water, and summarizes his conclusions as follows:

Typical *B. coli* (lactose +, indol +) is present in enormous numbers in excremental matters, and is absent from, or present only in small numbers in, substances free from undesirable pollution.

(5) Brit. Med. Jour., Sept. 21, 1912.

Typical *B. coli* is a decadent microbe when divorced from the animal body; hence its presence in a water in any number probably points to fairly recent pollution.

Pure waters, generally speaking, contain no typical *B. coli* in 100 c.cm. in a majority of representative samples.

The *B. coli* test even alone is of the greatest value, but a water supply should be finally judged on a summation of verdicts (geologic, topographic, bacteriologic, physical and chemical).

The *B. coli* test is by far the most reliable and speedy method of judging the degree of efficiency of the particular water purification process under investigation, and when a sterilization treatment is in operation, the certified destruction of *B. coli* should afford absolute proof, practically speaking, of the devitalization of all the microbes of epidemic water-borne disease.

The *B. coli* test having now survived the various vicissitudes of an earlier time, stands to-day as the most practical and delicate and rapid test for excremental filth, and may surely be taken as the most reliable indicator in its positive aspects of possible danger, and in its negative aspects of the almost certain absence of microbes associated with epidemic water-borne disease, and, generally speaking, as the one test which, above all others, it is least excusable for a water analyst to omit.

Aberrant Forms of B. Coli. W. G. Savage[6] calls attention to the various strains of *B. coli* and concludes that aberrant forms may be present as the only examples of the organism even in water which has the source of its contamination in sewage. The classification based on the power to ferment certain sugars, alcohols, etc., is of value for research, but is not applicable to water analysis. The bacteriologic analysis may serve to detect present contamination, but does not indicate the danger of future access of sewage pollution.

Sanitation of Canal Zone. The present sanitary conditions at Panama are contrasted with those prevailing

(6) Brit. Med. Jour., Sept. 21, 1912.

under the French by W. C. Gorgas,[7] who compares them with those of average northern communities.

The French, with an average force of 10,000 employees, lost from death during their construction period 22,000 men. We, with an average force of 33,000 men during about the same length of time, have lost from death 4,000.

The French, with an average of 1,600 white employees, lost during their construction period from yellow fever 2,000 men. We, with an average of 5,000 white employees during the same length of time, have lost from yellow fever only 18. Our maximum of sickness from malaria was in 1906, when we had in hospital from that disease 821 men out of every thousand of our employees. This number has been steadily reduced till the year 1911, when we had only 184 out of every thousand sick in hospital from malaria.

The general health conditions of the whole community are about those of a healthy community in the United States. The death-rate of the Zone, including the cities of Panama and Colon, for the year 1911, was 21 per thousand.

But what Gorgas emphasizes particularly is the health condition of the American employees of the commission. During the year 1911 we had 10,489 American whites connected with the commission. Their death-rate from disease was 4.48 per thousand. Of these, 10,489 Americans, 6,025 were men and 4,464 women and children. The death-rate from disease among the men was 2.82 per thousand. That among the women and children from the same cause was 6.72 per thousand.

Gorgas is satisfied that this unexpected condition of the American population is due solely to the fact that the American authorities have protected them from the infections of yellow fever and malaria. It seems to him that the effects of this experiment carried out on so large a scale will be far-reaching. The tropics at present, contain much the largest and most productive portions of the earth's surface. A man's labor in the tropics

(7) Jour. Amer. Med. Ass'n., March 29, 1912.

will bring him in many times the returns that the same amount of labor will produce in the temperate zone. Heretofore he has been kept out of these regions by his sad experiences with regard to health conditions. Panama is conspicuous as having been known as the most unhealthful place in the world, and also as having had carried into execution within its borders the greatest construction feat man has ever undertaken. It will at once be evident that if the white man can live, work and rear a family under these conditions at Panama, the same can be done in any other part of the tropics. And the tendency will be for man to emigrate, other things being equal, to those parts of the world where he can get the largest return for his labor. The great centers of civilization will develop in these regions, other conditions being the same, where man's labor applied to natural opportunities produces the greatest return, for the reason that under these conditions a greater proportion of the population can turn its attention to the arts, sciences, music, letters and other walks of life that have a softening and civilizing tendency.

It is an established fact that always in the past the Caucasian has wilted and died in the tropics. He has found it almost impossible to rear his children under these conditions, and when he has survived, a degenerate race has resulted. But here at Panama a force of 10,000 Caucasians has lived for the past six years in as good health as similar people live in the healthful parts of the United States.

The expense has been a little more than one cent a day *per capita.*

Quarantine at Panama. J. J. O'Connell[8] insists on the right and duty of the United States to establish quarantine for vessels passing through the canal. Our duty is so perfectly plain, our right so obvious and indefeasible, that on this point there will be no protest against the establishment of a world quarantine at Panama. Sanitary science has the right to demand this of the government of the United States. Political conditions make it possible to demand it of no other power,

(8) Long Island Med. Jour., April, 1913.

for on this strip of territory our government exercises exclusive and supreme jurisdiction.

It will take twelve hours for a vessel to make the voyage through the canal. These twelve hours can be utilized for inspection and fumigation without interfering with the natural flow of commerce. There should be a boarding-station at each end of the canal and a fumigating boat at each such station. At the Colon end of the canal there should be a temporary reception hospital. At the Panama end there are groups of islands, and two of these, Flamenco and Perico, are admirably adapted for use as sites for detention pavilions and contagious disease hospitals, just as we use Hoffman and Swinburne Islands in our own harbor. Permanent hospital wards and detention pavilions should be here constructed. The entire service should be a part of the public-health service of the United States.

Vital Statistics in New York City. The *Medical Record*[9] has published the report on vital statistics of New York City with conclusions as follows:

1. Vital statistics are the bookkeeping and accounting of the public-health movement and a guide for administrative, legislative, and social action.

2. The New York vital statistics are collected and tabulated by the Bureau of Records of the Department of Health. This bureau is, in addition, charged with many other duties, and its staff is inadequate for a detailed, intensive presentation of the vital statistics of the city.

3. The information contained in the reports of the Bureau of Records is insufficient and loosely correlated. With regard to the classification of the material and the statistical methods pursued, the New York reports are inferior to those of Paris, and with regard to the interpretation and analysis of the statistics, they are much inferior to those of London.

4. The reports fail to tabulate essential information contained in the marriage, birth, death, and sickness records which would throw important light on many sanitary and social problems of the city.

(9) Nov. 23, 1912.

5. Much of the statistical information of the various divisions of the department is prepared independently by the several divisions, published separately, and not correlated with the essential data of the report of the Bureau of Records.

6. The tabulation areas of the reports of the Bureau of Records are boroughs, and in some instances city wards. In many cases these bases are inadequate for administrative, social, or scientific purposes.

7. The two indispensable conditions for proper vital statistics are a correct count of the population and a correct registration of marriages, births, and deaths. The first requirement is met by frequent censuses. In this city, outside of the Federal census taken every ten years, we had a police census in 1895 and a Board of Health census in 1905, the data of the latter having never been published. Hence our rates are based on ten-year estimates. As to the second requirement, the registration of births in this city is still incomplete, and in the registration of deaths there is no standard classification of occupations or of races by mother tongue, which would insure uniform, reliable, and scientific information.

8. Physicians have not yet fully realized the importance of correct vital statistics, and the medical colleges and press have not laid sufficient emphasis upon their significance.

9. The Bureau of Records needs reorganization and a larger, well trained scientific staff. The recommendations of the Advisory Committee of Statisticians, appointed by the Department of Health in 1911, for a subdivision of the bureau into a Division of Records, a Division of Research, and a Division of Publicity, are highly commendable.

10. The various publications of the Department of Health give a full description of the work of the department, but the delays in their publication detract a great deal from their value, especially for current administrative and social purposes.

11. The annual reports are usually several years late, and bear many signs of careless editing. The weekly

reports have been, on an average, three weeks behind the time. The monthly reports also share in that shortcoming.

12. None of the publications of the Department of Health is designed to educate the masses of the people. They are of service to physicians and students of administration and sociology, but do not constitute a connecting link between the department and the general public.

The report contains the following recommendations:

1. That the Department of Health reorganize and enlarge the present Bureau of Records in accordance with the recommendations of the Advisory Committee of Statisticians made in 1911, and subdivide the bureau into three divisions: of Records properly, of Research, and of Publicity.

2. That the Board of Estimate and Apportionment appropriate the money necessary for the enlargement of the Bureau of Records in the interests of efficient administration and the public health movement, and that the salaries fixed for the responsible officers of the bureau be such as to enable the department to secure well-trained men for the positions.

3. That the work of the reorganized bureau be undertaken on a comprehensive scale and in accordance with modern scentific methods.

4. That all the statistical work of the department be done under the direction of the Bureau of Records to secure accuracy and uniformity of method, and that the records be promptly available.

5. That the reports of the Bureau of Records be published independent of the annual report of the Department of Health and be ready for distribution early every year.

6. That the city undertake a local population census every ten years, beginning 1915, and that the forty-acre tract unit of the last Federal census be made the basis for tabulation.

7. That the medical press give more analysis to public health reports and vital statistics and impress the profession with the importance of exact vital statistics,

urging them to coöperate with the Bureau of Records in making prompt, careful reports.

8. That the medical colleges instruct their students in the methods and principles of medical and vital statistics.

9. That the Department of Health make greater efforts to issue promptly its annual, weekly, and monthly reports.

10. That the weekly report be changed from a purely statistical sheet to an educational pamphlet intended primarily for the general public, and that arrangements be made with the newspapers of the city for periodical reproduction of the essential parts of the report.

11. That more and better means of contact between the Department of Health and the public be established in the interest of efficient administration and of the public health movement, and that the public receive regularly information regarding the department's most vital functions—food and milk inspection, prevention of disease, and care of babies and school children.

Adequate Salaries for Sanitary Inspectors. A. J. Douglas[1] emphasizes the importance of trained sanitary inspectors. The question of adequate salaries for sanitary inspectors should receive attention. These positions should be made attractive from a financial standpoint in order that good men may be tempted to fit themselves for the work; recognition should be given to men already holding appointments who pass examinations which they prepare themselves for, by placing them in line for promotion, and by increasing their pay.

Milk Tests.

Tests of Purity of Milk. E. Klaveness[2] recommends three simple tests for determining the relative purity of milk. The one most commonly used depends on the property of an oxidizing enzyme (catalysis) contained in milk, to split up a molecule of peroxide of hydrogen into its components, water and oxygen. Catalysis increases with the richness of the milk, the presence of

(1) Jour. of Health, March, 1913.
(2) Journal-Lancet, Jan. 15, 1913.

pus or blood, in old milk (over 36 hours), sour milk, or milk which has been contaminated during or after milking. Sterilization and refrigeration tend to destroy catalysis. The second test depends on a reducing enzyme contained in milk called reductase. It is characterized by the ability to decolorize methylene-blue, litmus and indigo, and will also transform sulphur to hydrogen sulphide. The milk may be considered relatively pure if this decoloration does not take place before the end of three hours. The test is made by adding 0.5 c.c. methylene-blue solution to a test-tube containing 10 c.c. milk; the mixture is shaken and a few drops of liquid paraffin are added, after which the test tube is placed in a water-bath or in a thermostat at 98 to 100° F.

Since there are a number of bacteria which do not contribute to the production of catalysis, the author recommends that any milk giving an oxygen liberation of 35 c.mm. within two hours when submitted to the catalysis test should be further examined by the leukocyte test. Cows showing 10 mg. leukocytes in 1 liter of milk may be considered as suffering from inflammation of the udders. There is usually found to exist a relationship between the leukocytes and streptococci present. Microscopic examination of the sediment will reveal the cause of the increased oxygen liberation found by the catalysis test.

NERVOUS AND MENTAL DISEASES.

Insanity.

Prevention of Insanity. G. H. Hill[3] believes that a great many patients may be prevented from becoming insane, by placing their confidence in the family physician, and by calling on him early and repeatedly; and, furthermore, by following his advice. A physician can prevent insanity by understanding its premonitory symptoms, and by shielding his patients from the various exciting causes of insanity, remembering that insanity begins insidiously, and that it may be far

(3) Iowa Med. Jour., Jan. 15, 1913.

advanced in its development, and possibly incurable, before it is understood and appreciated by the patient himself, or by his relatives.

In discussing the prevention of the causes of insanity, A. J. Givens[4] calls attention to the following points:

1. Tendency observable to expend time, labor, and money more on dealing with the results of mental, and many other diseases, than on their prevention; and the wastefulness and danger of pursuing such a policy.

2. Seeming connection between increasing longevity, and increasing insanity.

3. Increasing importance of limiting the marriage of the unfit.

4. Urgent need for the adoption of more practical measures for the lessening of the production, sale, and consumption of alcoholic beverages.

5. Disproportion of foreign to native born insane, and the necessity for the distribution of the foreign element outside cities.

6. Unappreciated opportunities offered by New York State and New England for the health-preserving life of the country.

7. Obvious necessity for the more rigid exclusion from this country of defectives.

8. Good results obtainable through establishment of psychopathic wards.

The Indigent Insane. In discussing the problem of the indigent insane, F. Woodbury[5] advocates the Wisconsin plan of county cure in which the acutely insane are domiciled in hospitals with all available equipment to facilitate recovery, while mild and chronic cases are placed in smaller institutions in which they have the advantage of residence in the country. The state retains supervision of the cases and contributes a part to the maintenance of the institutions. The author emphasizes the importance of removing the causes of insanity, especially alcohol.

Neurasthenia. J. H. Kellogg[6] emphasizes the impor-

(4) New York Med. Jour., June 15, 1912.
(5) Amer. Pract., October, 1912.
(6) Jour. of Health, March, 1913.

tant relations of enterogenous intoxication to neurasthenia and the need of constant regulation of the diet and regimen of such persons in order to maintain good health.

Neurasthenia is the name applied by medical men to a group of nervous symptoms which vary more or less with each individual case. The cause, in most, if not all cases, is systemic poisoning, of which the nervous symptoms are only consequences. The cure consists in a return to Nature—living the simple life.

EUGENICS.

The Law and Eugenics. Calder[7] suggests the following mode of procedure in securing eugenic effects by law:

To appoint a bureau of eugenics, to act with the State Board of Health, in connection with the public schools, the industrial school, the school for the deaf, dumb and blind, the state mental hospital and the state prison.

This bureau should gather all possible data relating to heredity, transmission of disease and pathologic tendencies, effects of environment and suitability in marriage. Appropriate information should be given to the public in bulletins, lectures and newspaper articles, and all data would be at the command of the State Board of Health.

To require the board of eugenics to provide for the personal examination of applicants, as to their fitness for marriage and reproduction; to issue certificates to those whose condition made sterilization advisable; to provide for operations at the public expense by qualified surgeons in the various counties of the state.

To make the operation a condition precedent to the release of the feeble-minded or perverted, now in confinement in the mental hospital and the industrial school, whose liberty otherwise would be a constant menace to the eugenic welfare of the community.

To require certificates of sterilization from applicants

(7) Northwest Medicine, December, 1912.

for marriage licenses whose physical or mental condition would otherwise make marriage a public detriment, such certificates to be shown to the other parties to the marriage contract, and to be recorded as evidence in legal proceedings affecting divorce, legitimacy and inheritance.

To authorize the courts of superior jurisdiction to impose, on the recommendation of the board of eugenics, sentences of castration as the alternative to imprisonment for certain crimes of sexual perversion.

To require the state board of pardons to make sterilization a condition precedent to the granting of paroles from penal institutions when, in the judgment of the state board of eugenics, sterilization was advisable.

A most valuable work from an eugenic standpoint could be done by a bureau in tabulating and listing the families of the state which could intermarry to advantage. Such a tabulation, if available before attachments were formed, would lead to new acquaintances and prevent many unfortunate unions which result from limited associations and accidents of propinquity. This, however, is beyond the present scope of statutory eugenics, except in so far as it suggests the broad field for a department of investigation, created and maintained by the public and for the public.

Sterilization. C. M. Clark[8] sums up the advantages of sterilization as follows: In the first place it absolutely stops procreation, and, second, the operation is attended with practically no danger. Moreover, this method of preventing procreation is immensely superior to all others proposed to this end, in that it is endorsed by the persons subjected to it. All other methods place restrictions and therefore punishment on the subject; this treatment absolutely does not.

We have in sterilization a feasible, painless, satisfactory remedy, and it is up to the physician to use it in ridding the world of its criminals, defectives and degenerates. Several states have already appointed committees to examine defectives and have given to surgeons the power to perform this operation. Let us agitate the

(8) Northwest Medicine, December, 1912.

matter and see to it that Utah is in the front ranks in this vital matter of race improvement.

Hygiene and Babies. Dr. Rosalie S. Morton[9] discusses methods of educating the public in personal hygiene by popular lectures, and describes as follows the efforts made in Iowa to arouse interest in the health of infants: The method of public instruction used in Iowa is to convert a baby beauty contest into a baby health contest. The children entered in the contest are divided into classes according to age, and environment from which they come. The "score card," in accordance with which they are examined, contains statistics for the healthy child, and the reverse of the card contains items of instruction for the parents. At the Iowa State Fair, 1912, it was discovered that Iowa babies measure above normal. They expect, within two or three years, to give the average of a thousand babies with the conditions in which they have been reared. Hundreds of score cards with information were distributed. In addition, talks were given daily in this department of the state fair; 236 babies were measured. More were entered, but failed to appear. The winner in the two to three year old girl rural contest this year was entered in the one and a half year old class last year and failed. Her mother learned wherein she was deficient and brought her up to normal by care in regard to diet, etc.

(9) New York Med. Jour., Jan. 25, 1913.

CLIMATOLOGY.

NORMAN BRIDGE, A.M., M.D.

INTRODUCTORY NOTE.

There is in the profession and public mind some loose thinking as to what climate is and can do and cannot do for mankind. We often forget that the atmosphere surrounding the earth is substantially the same everywhere, and is moving constantly, bringing different masses of it to each locality successively, and that the variations in temperature, dryness, barometric pressure, clouds and sunshine that constitute climate, are never great, although enough to produce some effects upon the sensations if not the health of individuals.

Many people believe that certain climates are infallible remedies for particular diseases and that the afflicted have but to go to them for sure recovery. The hypothesis is delusive, it relates especially to tuberculosis and it is unfortunate because it often leads to costly journeys and expensive sojourns to be followed by disappointment.

Invalids often derive much comfort from climates, rarely any remarkable effects upon their diseases that are not fairly to be credited to the greater comfort, novelty and ease of living in the new home.

For the moderate benefits that do come, directly or indirectly, there is reason for invalids to go to new climates if they can afford the expense and bear the possible homesickness. But it is unprofitable to have delusive hopes and vain regrets; it is far better in the long run to know the facts.

There are plenty of reasons for the study of the nature and effects of climates for the benefit of all the people and for its bearing on scientific problems in general, as well as because it is likely to lead indirectly to easier living and some escape from disease. But the studies should be done thoroughly and by scientific meth-

ods, not, as is too often the case, in slipshod ways, warped by preconceived notions and blind faith.

Many of the articles on climate in medical journals are of little or of no value—some less than none. Many such have been discarded in making this annual summary, though it is to be feared that all such have not been discarded. The present number contains several very valuable contributions justified by careful research and accurate statement. Notable among these are the articles by Huessy, Gordon, Henderson and others.

Norman Bridge.

CLIMATOLOGY.

Place of Climatology in Medicine. In discussing the subject of climatology, W. Gordon[1] lays stress on the importance of approximate isolation of influence. The ordinary examples of the effects of climate present the results of the complex action of various influences. The author illustrates the value of this principle of approximate isolation of influences by the study of the influence of rain-bearing wind on the prevalence of phthisis. He draws illustrations of this method from his own work.

Race has undoubtedly a very strong influence on phthisis, and to eliminate it only populations of the same race were compared with one another. With regard to sex, female death-rates for several reasons afford a better criterion than male, and only female death-rates were used when possible. Occupation has a marked effect. and therefore localities where special industries were almost universal were excluded from consideration. To eliminate density of population, town and country were not compared with each other. To get rid of the effect of preventive measures against the disease, the figures referring to periods previous to the introduction of these were used when possible, where preventive measures had been adopted. The progressive change in prevalence with lapse of time was prevented from introducing error by the comparison of only contemporary records. The other influences were shown to be so much less powerful than that of rainy wind that, where they could not be separately investigated, they might rightly be regarded as most unlikely to introduce error.

To illustrate the consequences of neglect of this principle he discusses the work hitherto done on the high altitude theory of phthisis immunity. This theory was

(1) Lancet, June 21, 1913.

first advocated to explain the asserted small mortality from phthisis in the Andes. Similar illustrations have been drawn from different parts of Europe and other regions of the globe where a low mortality from phthisis is found to be prevalent at high altitudes. A careful consideration of these data and a comparison of the mortality at different points show that the mortality at certain alitudes is higher than that at some lower altitudes. Lombard has claimed that there is a zone of increased prevalence of phthisis at a moderate elevation, above which the mortality from the disease diminishes. The author claims to establish from the data and statistics which he quotes, the following statements:

1. Altitude of itself has no evident effect on the mortality from phthisis such as has been supposed to exist. In other words, increasing altitude does not of itself appreciably decrease the prevalence of phthisis.

2. Altitude has, however, in exposure to rain-bearing winds, just the reverse effect, the prevalence increasing with the altitude, this being presumably due to increasing exposure to these winds.

3. There is some support for Lombard's view that an intermediate zone of increased phthisis prevalence exists, roughly corresponding to the zone of maximum humidity and rainfall, at least in exposure to rain-bearing winds.

The author reaches the following conclusions with regard to the Rocky mountains:

Next, taking the Rocky mountains, there is no doubt of the rarity of consumption in Colorado, New Mexico, and Arizona. From a study of Solly's "Medical Climatology" and Davidson's "Geographical Pathology" there can be no doubt of the rarity of phthisis in the eastern foot-hills of the Rockies and in their valleys and table lands, in spite of some prevalence of wind; but then the climate is very dry. The rainfall in places is as low as 9 inches annually. It does not seem, in fact, that, as regards the prevalence of phthisis, these districts differ much from lower countries which are similarly dry, like the Darling Downs of Australia or Upper

Egypt. Similar remarks apply to the high table lands of South Africa and Persia. In none of these situations has any attempt been made to prove increasing rarity of phthisis with increasing altitude. The statements regarding Abyssinia are conflicting.

Taking all this considerable mass of information into account, and it is all that is at our disposal, it seeems to me impossible to arrive at any other conclusion than that no evidence of any value exists in favor of the high-altitude theory of phthisis immunity. Whether a fuller investigation on the lines of the principle suggested will furnish any such evidence remains to be seen. To set the matter finally at rest it should be undertaken.

Sea Climate. M. Senator[2] reviews the history of thalassotherapy and notes that so far the application of sea climate has been confined principally to residence at the sea shore, and thus the influence of the sea has been only partially secured in consequence of its modification by the land. He enumerates the following conditions which are favorably affected by the sea climate: Anemia, neurasthenia, scrofula, tuberculosis, and affections of the respiratory tract. The chief curative factors are freedom from bacteria, increased sunlight, and a greater content of oxygen and ozone, sodium chloride, iodine and bromine, radio-activity and the stimulation of the action of the skin, and of the entire metabolism.

The idea of a floating sanatorium has been frequently proposed, even as early as the eighteenth century. The technical difficulties, however, have been so great that no successful application of this idea has been made. Senator states that a number of years ago he investigated this subject and concluded that it was impracticable. Among other reasons for this view he notes the following: The danger of sea-sickness, the dependence on the weather, the limitation of movement, and the monotony, besides the fear of the sea that is often present, and the unavoidable cost. The next project was a compromise between the health resort on the seacoast and the floating hospital. A hospital ship was

(2) Berlin. klin. Wochenschr., Aug. 5, 1912.

established in Boston which took invalid children on board in the morning and made a voyage about the bay and out on the ocean, returning every evening so that the children could go to their homes. This plan has been imitated in but few places, notably at a point on the east seacoast of Prussia, Zoppot near Danzig. Senator does not regard the inland river and lake sanatoria as deserving to be regarded as examples of thalassotherapy, because all the influences of the sea are lacking. From a personal investigation he gives the following account of the hospital ship at Zoppot.

The deck of an ocean steamship is fitted with beds for about forty persons. Each bed consists of a mattress, pillows and coverings which are removable and can be disinfected. The steamer makes a daily voyage in good weather during the summer months, cruising from eight a. m. to one p. m. along the beautiful coast of Danzig bay. No meals are furnished on board, but milk and tea can be supplied if desired. In order to secure as much rest as possible, no conversation is allowed during the trip. As a protection against the sun, smoke, etc., the after part of the ship is covered with a canvas. The ship sails during the cruise at the rate of two to three knots an hour, so as to secure as little production of smoke and as quiet and noiseless a motion as possible, since, as is well known, the noise of machinery and the shock of the motion of the crew are often unpleasant for healthy people and may be actually irritating to those in need of treatment. Those admitted on board must have a physician's certificate. They are mostly nervous, overworked people in need of the rest and quiet. Tuberculous cases are excluded. The justification for this provision is evident, although for some cases of tuberculosis the ship sanatorium is especially appropriate. This question has, however, been a source of much difficulty in previous attempts to apply thalassotherapy on ship-board. The presence of a physician is not necessary on these short voyages. However, it would be desirable if a physician could be secured for a number of voyages in order to make scientific determinations of the action of the sea-air on the blood, the respiration,

and the metabolism. The price of a single voyage is three marks (75 cents), with a reduction for a number of voyages.

Senator calls attention to one reason why this method has not been put in practice in other places. It can only be of service where reasonably quiet water can be obtained, and there are few places where the coast is not subject to the severe action of the waves so as to render such voyages difficult if not impracticable. Another difficulty appears to be the cost, although it would seem that this might be overcome so as to make such voyages practicable at least for patients with moderate means.

Mountain Climate. A study of the physiologic effect of mountain climate has been made by P. Y. Henderson[3] at Pike's Peak, Colorado. It is a widely believed fallacy that with a low atmospheric pressure one is subject to severe hemorrhages. One writer in the last century said that when crossing the Andes the mules breathe hard, their lips bulge and their eyes burst. Many hundreds of people go daily to Pike's Peak, and ordinary nose-bleed is no more common there than among people who take vigorous exercise at sea level. The only cases that Henderson saw of nose-bleed were traumatic cases.

A study of arterial blood pressure was made on the Peak, and there was found a slight fall in the arterial blood pressure. Those who are mountain sick often have fainting spells, weak pulse as symptoms of cerebral anemia.

In the seventies of the last century, Paul Bert showed that hemoglobin contained in the red blood cells is increased and that the ill effects of a low barometric pressure are due to a lack of oxygen. Some experiments were carried out in steel cylinders from which the air was pumped and it was found that in pure oxygen patients are as comfortable at one-fifth air pressure as when they are breathing the normal atmospheric air with one-fifth oxygen and four-fifths nitrogen.

Recently Henderson made some observations in New Haven. He breathed into a large boiler until the oxygen was greatly reduced. When below 10 per cent. he suf-

(3) Boston Med. and Surg. Jour., March 6, 1913.

fered from nystagmus, panting, and almost went into convulsions. There is no great difficulty, in his opinion, in making these studies on artificial mountain sickness at the sea level. It is only a question of oxygen percentage in the atmosphere.

A decrease in the amount of carbon dioxide in the blood in the lungs does not occur at low pressures. Zuntz, from his investigations, was unable to throw much light on the cause of sickness. Since Paul Bert not much progress has been made in this study.

At Pike's Peak Henderson had apparatus for determining the alveolar contents of the lungs; also the respiratory exchange during exercise, the amplitude of respiration, etc. A point of special interest was the determination of the volume of blood in the body. Another was the determination of the activity of the lungs possible at this altitude. Another was as to whether the lungs possess an active process of secretion; that is, whether the blood in passing through the lungs contains more oxygen than simple diffusion would provide.

After being one hour and a half on top of Pike's Peak, Henderson and his party noticed that their lips were blue. Toward evening they began to suffer about the temples from headache. When supper time came they had no appetites, and ate no supper. Their lips were still blue. They were nauseated. They felt like lying down. All this compares in a way to the symptoms caused by seasickness—the nausea, the distress about the temples, the frontal headache, which is splitting in character, the dilatation of the temporal vessels, conditions which point to some vascular reaction and which last for four or five days.

The railway carries about two hundred people up to Pike's Peak every day in summer, besides those who come up on donkeys. They stay about an hour. Of these two hundred, twenty or thirty are affected by the altitude. They have nausea and headache. Some faint when they reach the top, and if they try to climb, they again faint. Some stay until the next morning, get up at sun-rise, and then vomit. As soon as these people

return to Manitou, they make a prompt and perfect recovery.

Henderson has seen the floor of the lunch room at the top of the peak covered with prostrated people, some vomiting, some unconscious. Many lose all desire for food while on the peak. At sunrise, however, many get up and some fall in a faint. He recalled one individual who had scarcely left the train when his lips became blue, he vomited, and suffered other ill-effects of the high altitude. He was given oxygen, his lips soon became pink and he felt much better. However, within ten minutes he grabbed a bag of oxygen as if it were a whiskey bottle and made for his train!

Low air pressure and lack of oxygen affect people in extraordinary ways; some seem out of their heads. He reports several instances of crazy behavior. Most of those who go up become dyspneic and many have Cheyne-Stoke's respiration. At the least exertion people get out of breath; apnea may follow dyspnea. Some experience spells of dyspnea and then appear to get second wind.

The red blood cells are increased from five up to seven and a half million, the hemoglobin from 100 to 145 per cent. or even higher after six months' residence. The percentage of hemoglobin does not remain permanently high after one descends. The percentage of lymphocytes also is increased by residence in high altitudes.

The most important element of acclimatization to low barometric pressure is the development by the lungs of an ability to secrete oxygen from the alveolar air into the blood, thus compensating in part for lessened diffusion due to the low oxygen pressure in the atmosphere. The evidence for this statement is that on Pike's Peak there is more oxygen in the blood than in the air. In a newcomer on Pike's Peak the lips are often blue, but a day or two later assume a good color.

Influence of Climate and Race on Sexual Life of Women. M. Steiger[4] calls attention to the important influence of climate on the appearance of the first men-

(4) Corresp. Blatt. f. Schweizer Aerzt., July 12, 1913.

struation, which is an evidence of the sexual development of the young woman. This first menstruation is dependent on various influences, of which climate is one of the most important. The climate of a place is determined by its geographical position, together with local relations such as the annual variations of the weather. The climate is the sum of meteorologic phenomena which characterize the average condition of the atmosphere at any particular point on the earth's surface. Temperature is the chief factor in characterizing the climate of a place. According to this factor, climates are divided into tropical, temperate and polar, which correspond essentially with the geographic division into zones. For the subject under consideration the division into maritime and continental is of less importance than the altitude above sea level; thus the female inhabitants of Berlin menstruate as a rule a year earlier than those of Munich, which is situated 4.5 degrees of latitude to the south. In both these places the influence of life in a large city is active, but Munich is about 1,500 feet higher and as no other cause can be assigned for the observed fact it is quite justifiable to make the higher altitude of the more southern city responsible for the later occurrence of maturity.

The earlier authors concluded that menstruation in most countries belonging to the temperate zone begins at the age of from twelve to thirteen years. In the warmer countries of Asia it is said to begin at from eight to ten years; later observations of other authors have not shown any marked variations from these facts, so that until a short time ago the generally recognized dictum was: "the warmer the climate, the earlier the occurrence of menstruation." The age of occurrence of female maturity in general has been placed for the temperate zone at from fourteen to fifteen years. This average age undergoes marked variations according to the geographic latitude even within the limits of the temperate zone; but this law of the influence of the geographic latitude remains true only so long as the climate corresponds to the latitude. Engelmann on the basis of an abundant material concluded that in civilized

Europe maturity occurs earlier in the south than in the north, but it is incorrect to generalize from this observation, for in the arctic zone the period sometimes occurs especially early, and at the equator especially late. He sustained his claim by the following statistics:

1. *The Arctic Zone:* Arctic Indian women menstruate first at twelve and a half years, Eskimo women at from thirteen to sixteen; average, 14.6.

2. *Temperate Zone:* The average of the old world, 15.5 years; of North America, 13.9.

3. *Tropical and Sub-Tropical Zone:* South Asia, 12.9 years; pure tropics, 15.8; Siam, 14.3; Cochin China, 16.6; Java, 14.6; Somaliland, 16.0; average, 14.8.

The average of the third group is higher than the first—that is, the girls of tropical and sub-tropical countries menstruate later than those of the arctic zones. From a more detailed table Steiger concludes that menstruation at the equator is by no means the earliest and that very great differences exist between peoples who live in nearly the same latitude. Either the statistics are very uncertain, or the climate, while playing the chief rôle, is not the only factor. It is of course probable that the statements made by uncivilized people as to the age of beginning menstruations will be more or less unreliable.

In addition to the influence of climate, that of race constitutes an important factor. Thus it is asserted of the Jewish women of Budapest that they menstruate on the average a year earlier than the other inhabitants. Next to race may be placed inherited tendencies. Menstruation occurs earlier in some families than others. The condition of nutrition and the presence of disease may be the cause of delay in its appearance. The season of the year may also determine the first appearance of menstruation. Thus it is stated that Eskimo women menstruate only in summer, the cold of winter exercising an inhibiting influence. In the case of Europeans, however, it has been generally determined that more than half have their first menstruation in the autumn months. Among other favoring influences may be mentioned education, amusements, and luxurious

living as favoring the occurrence of menstruation, while women whose conditions of nutrition are unfavorable menstruate later. The following figures refer to Parisian women, who on the average menstruate at the age of 14 years and four months. For the following classes the figures were higher: 1. girls from the middle class, 15 years 2 months; 2. women engaged in manual labor, 15 years 10 months; domestics, 16 years 2 months; day laborers, 16 years one and one-half months. Women born in the city menstruated earlier on the average than girls from the country. Corresponding to this, Engelmann found that among 2,060 college students in America, first menstruation occurred nine months earlier than among American girls who did not pursue any higher education. Engelmann has shown that among the better classes it is not so much the reading of novels and theater-going which determine the earlier menstruation as the condition of nutrition. He regards the fat diet of the Eskimos as the determining factor for the earlier appearance of menstruation among them. A diet largely of meat is favorable, while hard labor is unfavorable.

Climate also exercises an important influence on the amount of blood lost in menstruation. This is greater in tropical countries than in the temperate and polar regions. As a general rule, the warmer climate favors an early appearance of the menopause in a similar way as it favors early menstruation.

Relative Advantages of Home and Foreign Cures. Kate C. Mead[5] has visited a number of the foreign and home cures in order to be prepared to compare their relative advantages. She has investigated especially the French water cures—Vichy, Royat and Aix-les-Bains. She concludes that visitors to France will find as much to interest them as in Germany, and most patients, if sent to Vichy or Royat or Aix-les-Bains, the selection being made intelligently according to the individual infirmities, will derive as much benefit as if sent to any of the German resorts. Royat, she considers especially suited to cases of anemia, debility, arterio-sclerosis and

(5) Boston Med. and Surg. Jour., Aug. 21, 1913.

cardio-vascular troubles, while Aix-les-Bains is best for gout, rheumatism and skin diseases, and Vichy, for dyspeptics.

The Malaga Climate. In a letter to the Lancet[6] the climate of Malaga is described as equable, mild, and exceptionally dry. The annual number of rainy days is 52½; only 40 days in the year are cloudy, while 195 are entirely cloudless. The north wind, "Terral," is icily cold in winter, and when it is blowing the warmth-seeking invalid has to keep indoors. Nature has given Malaga a fine climate and natural beauty in luxuriant vegetation, but the drawbacks to living here for the invalid are the utter neglect of cleanliness in the streets, the almost perpetual dust, and the inefficiency of the drainage system. At present there seems no prospect of improvement. Invalids are not wanted in Malaga.

Solar Therapy. L. Alkan[8] calls attention to the fact that while solar therapy is not new it has not been employed generally in large cities for the benefit of the poorer classes. He believes that the roofs of tenements and school buildings might be much more frequently utilized for this purpose by installing a simple solarium made with reclining chairs. In a stubborn subfebrile case treated by him in this way, the patient showed increase in appetite, slept better, and there was a gradual reduction of the temperature to normal, with a corresponding change of physical findings.

The peculiar domain of solar therapy, however, is in tuberculosis of the bones and joints and since the principal institutions for solar therapy are not available for the majority of children, the author has experimented to find out what results could be accomplished with the simplest arrangements and the least expense.

He reports a case of caries of the spine and of the os calcis together with tuberculosis of the cervical glands. The patient was doing poorly in the unfavorable conditions of a tenement. Alkan removed him to a balcony and exposed him to the sun, under which he improved

(6) Lancet, Dec. 14, 1912.

(8) Berl. klin. Wochenschr., Aug. 4, 1913.

rapidly. Later, on returning to the tenement, the disease recurred, but was finally cured by repetition of the solar therapy. This case illustrates what can be done by this method under very unfavorable conditions.

The Blood in High Altitudes. In carrying on a study of the blood in high altitudes, W. A. Campbell[9] encountered much obvious difficulty owing to changed climatic conditions and inaccessibility. Altitude increases the erythrocytes, hemoglobin, and leukocytes, thus favoring resistance. The heart acts faster and the pressure is lower, which tends to strengthen the cardiac muscles just as exercise of the general system strengthens the individual as a whole. Caution is needed at the beginning. The lack of oxygen and the consequent increased respiratory exchange increases metabolism and develops the chest. Dr. Campbell cited the case of a man who came to Colorado Springs in 1905 from a low altitude in the East. His chest measurement over the fourth rib was 37 inches; in 1909 his apices were expanding and the measurement was 38 inches; in 1912 he measures 39 inches, with no evidences of limited respiratory sounds.

Dr. Campbell considered the experiments of Henderson and Haldane on Pike's Peak important in showing that the adaptation to high altitude is mainly accomplished through the "increased secretory activity of the alveolar epithelium."

Blood Formation at High Altitudes. Experiments on 25 individuals who were employed at high altitudes, are reported by O. Cohnheim and O. H. Weber.[1] Residence in the mountains was from fourteen days to nine months. They found that both the number of blood cells and the hemoglobin gave higher values than are ordinarily found. The average hemoglobin value for healthy men is about 80, values above this being regarded as high. In the cases under investigation the values were all above 80, for the most part between 87 and 94. The number of erythrocytes lay between 5.2 and 6.3 millions. This indicates an actual new formation of blood corpuscles in high altitudes, and corresponds with the experimental investigations by Laquer.

(9) Boston Med. and Surg. Jour., March 6, 1913.
(1) Deutsches Archiv f. klin. Med., April 17, 1913.

Regeneration of Blood in High Altitudes. F. Laquer[2] concludes from a thorough investigation of the relations of the composition of the blood to the altitudes that there is a greater tendency to regeneration of the blood in high altitudes than in the lowlands. The tendency to regeneration in the high altitudes is practically constant for the entire course of the new formation of blood, but in the lowlands it diminishes in proportion as the anemia becomes less with the advancing reparation of the blood. The author sums up the results of his work as follows:

1. In a healthy young man a four weeks' stay at an altitude of 9,666 feet produced an increase in red blood cells and the proportion of hemoglobin to the unit of volume. This began in the second week, slowly, and reached its highest point after fifteen days, an increase of 15 per cent. for the erythrocytes and of 16 per cent. for the hemoglobin, which was then evenly maintained. The hemoglobin and the red blood cells ran a parallel course.

2. After return to a lower altitude the red blood cells suddenly fell to the former average value and the hemoglobin reached this point by a gradual diminution in the course of three weeks.

3. This relative increase in the capillary blood corresponds to an actual new formation of the blood.

4. After severe muscular labor in the mountains a reduction in the concentration of the blood in the finger tips occurred, which was probably due to vasomotor changes.

5. Six dogs which had been bled to about half their content of blood needed on the average sixteen days for a reproduction of the blood at an altitude of 9,666 feet, while four of them and two others required an average of twenty-seven days, or about 70 per cent. more, for similar regeneration in the lowlands.

6. A high altitude exerts a specific stimulus on the regeneration of the blood, the principal factor of which is without doubt the diminished partial pressure of oxygen.

(2) Deutsches Archiv f. klin. Med., April 17, 1913.

7. The experiments were made with the new hemoglobinometer of Autenrieth and Königsberger, which permits the exact estimation of the hemoglobin within 1 per cent.

Effect of Altitude on Frequency of Pulse. Observations on the effect of high altitude on the frequency of the pulse, especially under the added influence of muscular exertion, are reported by E. Stern.[3] He finds that the frequency of the pulse falls at night in high altitudes with about the same variation as in the lowlands. In general, the pulse is accelerated by muscular exertion in a similar manner as in the lower altitudes, but there is a peculiarity in its return to normal. Soon after the cessation of exertion the rapidity of the pulse begins to decrease and falls by a very steep curve. After exertion in the lower altitudes this curve is continuous, but soon reaches the former level. After exertion in the higher altitudes the diminution in pulse rapidity is interrupted by a temporary increase so that the curve is not continuous, but presents a rather sharp secondary elevation. It gives the impression that it is produced by two factors. The author's experiments were made on five individuals, two men and three women, who ascended from an altitude of 1750 meters to an altitude of 2600 in the course of about six hours, returning to the same level in a period of about five hours. A notable fact was that the rapidity of the pulse increased during the descent. The author's explanation of this fact is that the effort at descending a steep declivity requires practicly the same amount of exertion as the climb, because it is necessary continually to support the weight of the body to prevent oneself from falling. Added to this the effort at descent is made when the individual is fatigued so that the exertion occurs under unfavorable circumstances. The peculiarity in the return of the pulse to normal is probably due to metabolic changes and to the influence of the respiration.

Treatment of Surgical Tuberculosis in High Altitudes

(8) Berlin. klin. Wochenschr., April 21, 1913.

by Sunlight and Fresh Air. A. Hüssy[4] discusses the treatment of surgical tuberculosis by means of sunlight as carried out in Rollier's clinic at Leysin. The benefits derived from the high altitude are shown by the marked increase in blood formation, a reduction in the number of leukocytes, an increase in the number of red blood cells, an increase in hemoglobin, and a better supply of oxygen, and as a result an increased combustion and excretion of carbon dioxide. There is a temporary increase in the frequency of the pulse and in the frequency of respiration which becomes deeper. In addition to the effect of altitude to which the above phenomena must be ascribed, there is the action of sunlight. There is a marked increase in the amount and constancy of the sunlight in high altitudes as is shown by the following figures: Davos, at midday in winter has a sunlight six times as bright as Kiel, and in midsummer it is 1.8 times as bright. The entire intensity of the light in December at Vienna is 95, at the Bernina hospital 237. In January at Vienna 85, and Bernina 279. Rübel, Rollier and Rosselet have found the ultra-violet rays much stronger in the mountains than in the level country, and the ultra-violet radiation in summer is twenty times as strong as in winter.

Light has a pronounced bactericidal action which is especially due to the ultra-violet rays. How the rays of light act is not explained, possibly oxidation processes are set up which cause an alteration in the protoplasm of bacteria directly affected by light. Ferments and toxins like diphtheria toxin are sensitive to ultra-violet rays, but antitoxin is not. Light acts as a vitalizing and energizing agent, the chemical rays appearing to play a greater rôle than the heat rays. There is an increased production of pigments which absorb the rays of light which tend to cause inflammation and thus protect the organism from injury by the light. The light also provokes very frequently a greater growth of hair on the parts exposed to the sun. As to the deep action of the light a final decision can not yet be given. Chem-

(4) Corresp. Blatt. f. Schweizer Aerzte, July 1, 1912.

ically active rays appear to pass the skin and some portion of the body. Still the blood in thick layers absorbs all rays except the red and reddish yellow. The latter, according to Leukei, may penetrate to a greater depth than from 5 to 6 cm. (from 2 to 3 inches). A notable direct bactericidal action of light in the depth of the tissues can scarcely be expected, but the inflammatory processes excited by the intense action of light must alter the conditions of existence of bacteria found in the tissues. The blood absorbs with the light a large amount of energy which is not lost to the organism, although there are few satisfactory hypotheses with reference to the chemical changes produced by it. The experiments of von Schläpfler are of great interest. This observer showed that the blood after exposure to light may be self luminous and may act in a photo-chemical manner on a photographic plate. Probably by the influence of light on the superficial layers of the body there may be produced changes in the functions of deep-seated organs and even in pathologic processes.

Hüssy describes the technic of Rollier as follows: The patients on arrival are placed in bed for a few days in order to favor acclimatization even if their condition does not require rest in bed. After two or three days they are placed on the galleries and exposed successively for longer periods to the outdoor air, and the local insolation of the tuberculous disease is begun. On the first day a tuberculous joint is exposed three times for a period of five minutes, on the second, three periods of ten minutes, these periods being increased each day by five minutes, so that the patients at the end of the first week receive insolation for about one and a half hours. The rapidity of increase must be determined by the resisting powers of a patient. When no insolation is being carried on the wounds are aseptically bandaged and are treated at intervals with the uviol lamp and Bier's congestion method. At the same time with the local treatment general exposure to the sun is initiated by carefully exposing the feet at first and on the subsequent days a continually greater portion of the body from the feet upward. Gradually patients are ac-

customed not only to exposure to the air for the entire day, but also to endure a sun bath for hours at a time.

In order to avoid congestions the head is protected by a sort of parasol or a white hat. In this careful way it is usually possible to carry out the heliotherapy of the entire body without the occurrence of the slightest disturbance. In some cases nervous patients get a headache by too long exposure to the sun. Thin, excitable patients bear the effect of a high altitude provided that the exposure to the sun is limited. Corpulent, phlegmatic patients bear such exposure better. Patients who have been acclimated pass the entire day on the galleries and in summer may spend the night there. In winter the sun is unusually warm and the air at this altitude is very dry and generally free from wind. In general, patients in the sun baths feel extraordinarily well and the air at this altitude stimulates the appetite so that the body weight tends to increase. In this respect there are marked differences. In some cases while there is a general feeling of well being and an objective improvement the increase in body weight does not occur. The explanation of this fact is the marked quickening of metabolism through the influence of the sun bath. Practically no medicine is used except cod liver oil.

Rollier is a strong advocate of strict immobilization of diseased joints. Cold abscesses are treated by simple puncture followed by an injection of 10 per cent. iodoformol or iodoform glycerin, in order to prevent a mixed infection. Under all circumstances every effort is made even to daily aspiration, to prevent the spontaneous opening of an uninfected tuberculous abscess. If it is impossible to hinder the formation of fistulas, the fresh openings are covered during the intervals of insolation with pieces of gauze soaked in alcohol in order to restrain, so far as possible, a secondary infection. The operative opening of a purely tuberculous abscess which has not been secondarily infected will without doubt be more and more regarded as a technical error.

Under the influence of heliotherapy one symptom after another disappears, cold abscesses subside spontaneously, the fever, which is usually produced by sec-

ondary infection and has in many cases continued for months, as a rule gives place in a short time to a normal temperature. Large open wounds and ulcerations cicatrize rapidly. The analgesic effect of insolation is a striking feature in the beginning of the treatment.

The prognosis of closed tuberculosis under heliotherapy is good, but cases which have become infected and in which the general condition is already below *par* are less easily influenced. When long continued suppuration has induced amyloid degeneration the case has progressed so far that the mountain sun can no longer produce a cure.

Cold Dry Climate in Tuberculosis. A. D. Blackader[5] reviews the advantage of residence in a cold dry climate in the treatment of some forms of disease. It has been shown that the stimulating and health-giving properties of the steadily severe but dry cold of Northern Canada, especially the Laurentian plateau, confers a vigor not to be found elsewhere. Sleep is favored when the body is properly protected; the appetite is stimulated and digestion is better; oxidation is increased. Those who suffer from any interference with the free passage of air through the nostrils do not react well to cold and gain little benefit in winter. In inflammatory conditions of the larynx and trachea cold air may act as an irritant and prove harmful. Extreme cold is not desirable for cases of gout, arthritis or neuritis. For those suffering from advanced degeneration in any organ, for those advanced in years, or for the very young, extreme cold may be distinctly harmful. At St. Agathe, Quebec, the consumptives show a rapid and permanent gain in weight in cold weather; night sweats become infrequent, the amount of hemoglobin rapidly rises; cough and dyspnea disappear.

(5) New York Med. Jour., Aug. 3, 1912.

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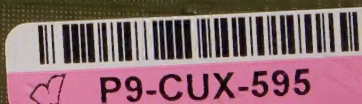
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